Food Manufacture

Incorporating Canning, Packing, and Preserving

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A Dilemma!

IN THE *Homœopathic World* for April we came across two extraordinarily conflicting statements on the interpretation of the animal experiment, and they appeared on two consecutive pages. On page 122 we read:

". . . And certain not very convincing experiments have been made on animals which were intended to show that consumption of aluminium cannot do any harm. Animals and men react differently to different poisons. Dogs can eat filth with impunity and rabbits Belladonna."

But on page 123 it is stated that

"A large number of scientists have experimented with white bread and have discovered that it is a danger to health. Rats and other animals fed on white bread and water will promptly fall ill and die. Control animals of the same kind fed on wholemeal bread and water will flourish and increase, and the females will have healthy offspring."

Now, where do we stand? Will the *Homœopathic World* tell us just what they do mean?

Aluminium.

The mention of aluminium calls to mind some interesting literature which has recently appeared on the amounts of this metal taken up by foodstuffs from cooking vessels and the possible attendant dangers to health. There are obviously two opposing schools: one asserts that the danger of food contamination by aluminium is very real and serious; the other, representing the prevailing opinion, is confused and doubtful about the matter. Why there should be any doubt concerning so vital and fundamental a question is, in these days of science, a most amazing thing, and yet it is actually the case. It is just this state of fog, ignorance, and lack of precise data, which provides an opportunity for the publication of scare-mongering opinions, samples of which we have recently had in our hands. Some of the views expressed in several publications which we have seen *may* be perfectly sound, but we feel that many are open to doubt—to put it mildly. It would seem that many of the experiments cited were not carried out on a proper scientific basis and for this reason are valueless.

Such being the case, it is particularly gratifying to note the recent publication of two scientific papers by workers at the Mellon Institute of Industrial Research, and we have summarised these on a later page. The main conclusions reached were that the taking up of aluminium by neutral foods is negligible, but acid and alkaline foods are relatively more corrosive. In no case, however, is sufficient aluminium dissolved to interfere seriously with absorption. An average daily intake of the metal where all foods are cooked in aluminium is estimated at 12 mgs., of which about 5 mgs. is derived from the utensils.

Toxicity.

The important point, however, is the physiological effect of the ingestion of aluminium. Here, again, we are in a realm of conflicting opinions. Many papers have been published dealing with experiments on animals, which claim to prove that aluminium fed to an animal is not absorbed into the animal tissue and apparently does no harm. Nevertheless, Dr. S. Judd Lewis claims to have demonstrated that normal blood usually contains no aluminium, but that a considerable quantity of the element is found in the blood of the same person after feeding with even one meal of aluminium-containing food.

It is obviously a matter of urgent necessity that the whole subject should be investigated in an absolutely unbiassed manner. Who is going to do it, and who is going to provide the funds?

A beginning has, however, been made and some important researches have recently been carried out. We look forward to the early publication of the results with great interest.

Bananas *v.* Sausage.

Evidence of efforts to implant food wisdom in the young Japanese mind is provided by *The National Provisioner* in a quotation from a sample of school composition.

"The banana are great remarkable fruit. He are constructed in the same architectural style as the honourable sausage. Difference being skin of sausage are habitually consumed, while it are not adviceable to eat rapping of banana.

"Banana are held aloft while consuming; sausage are usually left in reclining position. Sausage depend for creation on human being or stuffing machine, while banana are pristine product of honourable Mother Nature.

"In case of sausage both conclusions are attached to other sausages; honourable banana, on the other hand, are joined on one end to the stem and opposite termination are entirely loose.

"Finally, banana are strictly member of vegetable kingdom, while affiliation of sausage is often undecided."

Botulism.

The *Jour. Am. Med. Assn.* (1931, p. 177) draws attention to the fact that the 1931 outbreak of botulism, which was the first one recorded in U.S.A., was traced to a salad made from a mixture of *home-canned* vegetables. It is stated that home-canned string beans have caused more outbreaks of fatal botulism than any other canned food. The journal mentioned advocates an educational campaign, pointing out that many of the home-canning recipes antedate present-day scientific knowledge of canning and botulism.

Food Exhibition.

Readers are reminded of the British and Empire Food Exhibition to be held in the Empire Hall at Olympia from May 21 to June 4.

The main object is to demonstrate to the general public and the distributive trade the variety and extent of the food resources of the Empire.

It promises to be an exceptionally interesting exhibition; films of factories are to be shown and there will be working models of canning operations.

Empire or Foreign?

Apart from anything else, the exhibition should be useful in putting the finishing touches to our education in geography. Judged by a letter we received the other day from New Zealand, this is not generally up to standard. The writer of this letter confessed that he "got a little hot under the collar" over some correspondence which he had been having with a firm in England who referred to New Zealand as a "foreign country." Our correspondent goes on to remark: "We were always under the impression that New Zealand was about 99 per cent. a British country. We employ a High Commissioner; we spend thousands of pounds on keeping people in England spreading the doctrine of Empire goods; your Government has spent millions on the same object, and yet you get someone in England suggesting that New Zealand is a foreign country."

Canned Fruit Pulp.

The *Fruit Prods. Journ.* announces that experiments made during the past ten years by investigators of the Fruit Products Laboratory of the University of California have developed a simple technique of preparing and canning fruit pulps for use by ice-cream factories, in soda fountains, and in the home. Comparative tests prove that this product retains its flavour and colour for at least three years. It is more satisfactory than the frozen pulp of most fruits, with the exception of berries, for the reason that it retains its colour after the container is opened and will keep indefinitely in the sealed container. Frozen fruit pulps, on the other hand, rapidly turn brown on thawing and deteriorate in flavour.

The new canned pulps or purees are suitable for use in preparing commercial ice-creams and ices, soda fountain drinks such as fruit "malts," and for home use in whips, gelatin desserts, puddings, frozen desserts and home prepared fruit and milk beverages.

Standard cannery equipment is used in their preparation. Sugar is usually omitted, but may be added to the pulp before canning, if desired. The fruits recommended for canning in this manner are peaches, pears, apricots, plums, and dried prunes.

Barrelled Peaches.

E. M. Mrak and V. Hendriques, of the Fruit Products Laboratory, University of California, now report the following results of the trial shipment from San Francisco to Germany of eighteen 50-gallon paraffin lined spruce barrels filled with halved peaches preserved in two types of solution—(1) 6 per cent. sulphurous acid with water diluted to 0·34 to 0·41 per cent. strength (3400-4100 parts per million); (2) a solution prepared by adding 26 fluid ozs. of 90 per cent. formic acid solution per 50-gallon barrel —*i.e.*, an approximately 0·4 per cent. solution. The experiment was prompted by the high tariff on canned goods shipped to Germany relative to that on barrelled fruit.

It was found that the peaches preserved in SO_2 solution arrived in good condition, except for softening, and that the extent of this softening was dependent on the concentration of the SO_2 solution used. The fruits packed in formic acid remained firm, but their colour was inferior to that of the peaches in SO_2.

This work is to be continued for another year.

Cans Lack Music.

On the occasion of an address by Mr. F. Hirst to the Birmingham Rotary Club on "The Merits of the Tin Can as a Container for Preserved Food," delivered on March 7, Past President A. H. Matthison, in reply to a question about canned music, remarked that if canned music were equal to the preserved fruit, then he would be satisfied; canned foods did not poison one, but canned music sometimes did.

The President, referring to Mr. Matthison's interest in the canning industry, said, "No can can be a perfect can if it lack laquer." We suggest that if Mr. Matthison can can a popular melody, on the lines of "Sister Susie," it would add interest and charm to the operation of opening a tin of sardines or peaches—creating quite a pretty illusion of the joyful release of happy souls, as well as having a decided publicity value.

Bad Times.

A manufacturer who stops advertising because times are bad is like a man who leaves his umbrella at home because it is raining, says William Springett.

Nitrite.

On April 6, Osman Jones read a paper before the Society of Public Analysts on the subject of nitrite in cured meats. Analyses giving the amounts of nitrite in various samples of nitrite-cured meats show that the proportion may rise to as high as 960 parts per million when brine has been repeatedly used for curing. Experiments indicate that the only function of the nitrate is to impart a red colour to the meat by reduction to nitrite, and the results so far obtained indicate that it would be advantageous to replace nitrates in curing by a very small amount of nitrite.

Vitamin B in Bread.

Much has been written and spoken about the vitamin B deficiency of white bread. The latest tirade comes from *New Health*, which has adopted the amazing slogan, "The whiter your bread the sooner you're dead." If this is so, and as more than 95 per cent. of the population eat white bread, why is the average life of man increasing? Why, during the war, did the troops get the white bread while the non-combatants were given foul preparations known as standard bread, etc., which brought about a lower vitality and a train of internal disorders which kept the medical men busy for years? Why will some people persist in presenting an absurdly biassed view to a credulous public; are they really serious, or are they having their little joke? Who can tell?

Two Japanese workers, Hashitani and Sako, state (in the current *Cereal Chemistry*) that, although white bread is deficient in vitamin B, such deficiency is compensated for by other articles of food in the diet, and it can be completely corrected by a little dried brewers' yeast being added to the bread. Feeding tests made on pigeons with bread containing varying quantities of dried brewers' yeast indicate that the optimum amount to be added is 0·3 to 0·4 per cent. It is also shown that vitamin B is not decomposed in the baking process.

Every man has his own particular fancy, and it is not for us to "monkey with his muttons." Some like 10 per cent. of cellulose and bits of burr stones in their bread; others don't mind going to the trouble of adding a little brewers' yeast in preference to being reared on a Stone Age diet. It's all a matter of temperament! Whether it's a case of "The whiter your bread the sooner you're dead," or "The browner your bread the whiter your head," or "The blacker your bread the more you'll see red," really does not matter to us personally, so long as it represents the truth—or an approximation thereto.

Food Preserving in 1851.

A correspondent has illustrated the rapid growth of the food preserving industry by bringing to our notice some interesting information relating to the Great Exhibition of the Industry of all Nations held at the Crystal Palace in 1851.

In that year the preserving of food had been applied practically only for 25 years previously, and it was hoped that exhibitors would show new methods and ideas.

The demand for preserved meat in the tropics and on long voyages had stimulated the trade, and several hundreds of canisters of preserved meats were on show. The jury adopted the simple but effective test of opening each can and tasting the contents. In every case the meat was found to have lost its taste of freshness, to be rather soft, but to have retained all its nutriment, and guarantees were given that some of the canisters had been sealed for 25 years. Vegetables were found to be even fresher than the meat, especially beet, carrots, parsnips, and salsafy. Green peas were found not to preserve so well, while cabbages, turnips, and celery were found to be hardly worth preserving at all.

Preserved Pig.

Not all of the substances were in tins. Masson's dried compressed vegetables were in the form of cakes, and Smith of Dublin exhibited a whole pig (which we illustrate on another page) preserved so that it could be carried at sea, even in the tropics, without damage.

New Brunswick and Nova Scotia contributed some excellent tinned salmon, which was naïvely described as being "quite equal to the English."

From France came a good collection of preserved meats and vegetables in hermetically sealed cans, honourable mentions being awarded to the exhibitors of preserved truffles, peas, salsafy, and sardines in oil.

The sensation of the exhibition was Gail Borden's American meat biscuit, which had never previously been brought before the public. It was formed of the best wheaten flour and beef, put up in the form of flat cakes. By the addition of hot water a satisfactory soup could be formed, and the inventor claimed that 10 lbs. of the biscuit would support a healthy working man for a month.

Several other specimens of meat biscuits were shown, one of which was large, coarse, disagreeable to the taste, and so did not even get a mention.

Moore's "Concentrated Preserved Milk" won a prize medal; Gamble, and Ritchie and McCall both won honourable mentions for preserved milk in hermetically sealed cases, although the samples varied greatly in quality.

The preserved milk of Fadeuilhe was described as a curious preparation which attracted moisture and had a decided flavour of cheese, while the preserved milk of Oudin and Co. of Paris was sweetened too much.

One interesting exhibit was that of a canister of boiled mutton prepared by the exhibitor for the Arctic Expedition of 1824. A large number of these canisters were landed from H.M.S. *Fury* when it was wrecked, and were found by Captain Ross nine years later in a state of perfect preservation, although annually exposed to a temperature of 92° below and 80° above zero.

Narcotine and Vitamin C.

Recent investigations indicate that narcotine is the precursor of vitamin C, which is formed during the ripening of fruits and vegetables. Rygh, Rygh, and Laland (*Z. Physiol. Chem.*, 1932, vol. 204, p. 105) have isolated a crystalline substance from orange juice and apple juice. In all cases mixtures containing variable proportions of crystals and a heavy oil were obtained, which, on recrystallisation from alcohol, gave needles only (m.p. 176° C.). Their physical properties and chemical tests show them to be identical with narcotine. Pure narcotine, however, has no antiscorbutic properties, but experiments with 15,000 apples of various degrees of ripeness demonstrated that the narcotine content varies with the degree of ripening, a negligible amount being found in the fully ripe fruit. These, coupled with animal experiments, indicate that the vitamin is produced from the narcotine in the process of ripening.

In another paper, Laland (*ibid.*, 1932, vol. 204, p. 112) describes the isolation of narcotine from young unripe vegetables. Twenty kilograms of tomatoes yielded a juice of *p*H 4·2 and 20 grams of narcotine. One hundred kilograms of cabbages yielded 25 litres of juice with a *p*H of 6·3 and 40 grams of narcotine. In the case of potatoes 20 kilograms yielded 10·4 kilograms of juice, *p*H 5·6 and 12 milligrams of narcotine. No yield was obtained from mountain cranberries or milk.

O. and A. Rygh (*ibid.*, p. 114) describe their chemical investigations on narcotine and its derivatives as antiscorbutics. Guinea-pigs were fed on a basic diet containing oat grits, wheat bran, skim milk, fresh butter, and the substance to be tested. Antiscorbutic value was absent from cotarnine, meconine, cotarnaminic acid, and normeconine. On the other hand, dimethyl nonarcotine and methyl nonarcotine were active. They state that the action of germinating seeds converts narcotine into an antiscorbutic substance having the reactions of a phenol. The subject is a very complex one and by no means settled. In this connection it should be noted that Smith and Zilva at a meeting of the Biochemical Society (*Chem. and Ind.*, 1932, vol. 51, p. 166) described experiments which do not confirm the conclusions of O. and A. Rygh.

"Quality."

At a meeting in February of the Huddersfield branch of the Institute of Chemistry, H. M. Mason, chief chemist, Messrs. J. Mackintosh and Sons, Ltd., gave an address on "Chemistry in the Mass Production of Foods."

Mr. Mason gave examples to show that an article produced in bulk might be prepared with greater care and attention to detail in recipe and process than was either possible or profitable when the output was small.

It was suggested that the most important function of the works chemist in a food factory was to take care of the quality of the products, and it was therefore necessary to know exactly what was meant by the word "quality." This depended on the point of view. The Food and Drugs Act merely required that the article in question should be free from harmful ingredients and genuine, and made no provision for the higher and lower grades of quality to be found in commercial foodstuffs.

Jam and Pulp Manufacture

Scientific Principles

The following is a discussion of the main principles underlying the manufacture of jams and fruit pulps intended for use in jam making, and has been compiled mainly from notes supplied by T. N. Morris, M.A., Agri. Dip., of the Low Temperature Research Station, Cambridge.

Building up a Recipe.

THE BUILDING up of a recipe for a jam has been much simplified by the recently introduced "Standards for Jams," for a statement of which reference may be made to *Analyst*, 1930, vol. 55, p. 695. These fix the quantity of soluble solids (chiefly sugar) in both first and second quality jams at a minimum of 68½ per cent. They also state the minimum percentage of fruit content in finished jams of first and second qualities; this is, in first quality strawberry jam, for instance, 42 per cent., while in black currant it is 30 per cent.

Thus we can say that for each 63 to 65 lbs. of sugar (there will be anything from 3 to 5 lbs. of soluble solids in the fruit) the amounts of fruit specified in the standards must be taken. This fixes the proportions of the two most important ingredients.

ANALYSIS OF FRUITS USED IN JAMS.
(MACARA.*)

	Acidity	Pectin (average)	Total Sugars
Black currants ...	3·48	1·08	6·44
Red currants ...	2·54	0·58	4·80
Damsons ...	2·48	1·15	7·53
Gooseberries ...	2·22	0·81	3·51
Raspberries ...	1·73	0·53	3·53
Plums (Victoria)	1·64	0·81	7·43
Greengages ...	1·20	0·95	8·00
Apples	1·11	0·75	7·60
Strawberries ...	0·93	0·53	5·48
Cherries ...	0·88	0·24	8·33
Blackberries ...	0·85	0·59	5·10

The amount of pectin to be added will depend to a great extent on the kind of fruit and on its condition. When pectin is of first-class quality a very little goes a long way. For some jams, such as black currant and gooseberry, it is often unnecessary to add any pectin. In very general terms it may be stated that for first quality jams the amount of pure powdered pectin to be used for each 100 lbs. of jam varies between 1½ and 4 ozs., while for second quality jams, in which only 20 per cent. of fruit is used, the amount of powdered pectin required may be from 6 to 8 ozs.

With regard to the use of glucose, there are no serious objections, providing the amount added is not excessive. It does not seem advisable to add more than about 15 lbs. in a recipe for 100 lbs. output; some of the best jam makers do not use any. The use of glucose is attended by the possibility of the gel being somewhat weakened; also it is questionable if there is any advantage in price to be gained, since glucose is only equivalent to about two-thirds to three-quarters of its weight of sugar; moreover, care must be taken to keep the SO_2 content of jam below the permitted limit—viz., 40 parts per million, whereas the amount permitted in liquid glucose is 450 parts per million.

* Macara, *Analyst*, 1931, p. 35.

Control.

In these days when the chemist and his laboratory form an essential part of most manufacturing organisations, it is unnecessary to discuss the subject in its general aspect with reference to jam manufacture. The jam chemist has his time well occupied in examining raw materials to ensure that they are up to standard, in testing the finished product, and in controlling the various manufacturing operations. It should be emphasised that for the production of good jams it is absolutely essential to get quick results in the laboratory, as it is necessary to know that the jam is quite satisfactory before it is made in quantity. Fortunately, the tests take only a few minutes to carry out; when working, samples of jam are taken every 15 minutes, one girl carrying out the Lane and Eynon's test for inversion and another girl determining the total sugar percentage by the refractometer.

It is obviously important that control must be exercised over the inversion of the sugar in the finished jam. If this has not proceeded far enough, cane sugar is likely to crystallise out in the jam after prolonged storage; if too far, dextrose may grain out and the jam become a honey-like mass. Rapid tests must therefore be carried out on trial boils; should 30 to 50 per cent. of the sugar become inverted, no trouble is likely to be experienced; if it is greater or less than this, adjustment may be made by cutting down the size of the boil in the former case, or adding acid or invert sugar in the latter.

Sugar.—The following determinations, one for total sugar and the other for inverted sugar, should be carried on throughout the day. Adjustments in the recipe are based on them and on the experience of the jam boiler.

To find the total sugar content of the finished jam by means of a refractometer, a little of the jam is

squeezed through muslin on to the prism of the instrument and the reading taken. This requires some correction (although this is minimised by well mincing the jam beforehand) because the jam is not quite homogeneous, so a series of corrections for different jams is applied. The true percentage on which the correction may be based is determined by methods recommended by Macara (*Analyst*, 1931, vol. 55, p. 353).

The amount of invert sugar in the jam may be estimated by Lane and Eynon's methylene blue method as follows: 15 gms. of jam are dissolved in *cold* water and made up to 1 litre. This gives a solution containing approximately 1 per cent. of sugar. The solution is filtered through glass wool into a burette and run into 10 c.c. of boiling Fehling's solution contained in a small flask, until the blue colour disappears. About 3 drops of a 1 per cent. solution of methylene blue are then added and the titration continued cautiously until this colour disappears. The end-point is reasonably sharp.

In the meantime the amount of total solids in the jam is found by refractometer (as described above). Suppose this is 68 per cent. and assume it is all sugar. Now 10 c.c. Fehling's solution are equivalent to 0·0475 gm. of cane sugar which has become inverted. Suppose n. c.c. of jam solution are required for titration. Then n. c.c. contain 0·0475 gm. inverted cane sugar. 1 c.c. of the jam solution contains approximately 0·01 gm. of sugar. Therefore n. c.c. contain $0{\cdot}01 \times n$.

Since it has been found by refractometer that the jam really contains 68 per cent. of sugar, n. c.c. of the solution actually contain:

$$\frac{n. \times 0{\cdot}01 \times 68}{66{\cdot}7} \text{ gms. of cane sugar.}$$

Therefore the percentage of cane sugar inverted is:

$$\frac{0{\cdot}0475 \times 66{\cdot}7}{0{\cdot}01 \times 68 \times n} \times \frac{100}{1} = \frac{31682{\cdot}5}{68 \times n}$$

If preferred, the actual percentage of invert sugar may be found by substituting 0·5 for 0·0475 in the calculations.

Pectin.—Juice and bought pulp may be tested for pectin. A rapid, though approximate, determination is made by precipitation with acetone. The type of precipitate is an excellent guide as to the nature of the pectin present; if it is soft and more or less flocculent it consists largely of pectinous or pectic acids, valueless to the jam maker; if it is hard and firm the pectin is of good quality.

If the gel is obtained prematurely—*i.e.*, before the specified concentration of total solids is reached—the quantity of added pectin should be reduced. If there is a sticky, indefinite end-point in spite of the fact that a good deal of pectin has been added, the *p*H of the material is probably at fault. Tarr found that the *p*H of the pectinous juice (or pulp) before the addition of sugar should be about 3, and much can be done to cut down the amount of pectin added by attention to the acidity.

Trial Boils.—These are necessary at the beginning of a season or when making some radical change in the recipe or when preparing a special jam; two are usually enough. Most manufacturers have some means, such as those described above, of quickly estimating the sugar content and inversion of the jam, and of making other laboratory tests, but even without these the weight of output from a boil provides useful information, since a manufacturer should know from experience what output to expect from a given weight of sugar.

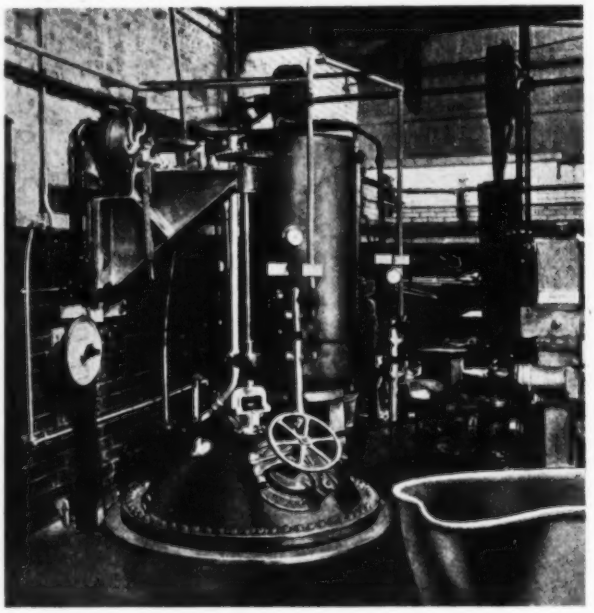


FIG. 1.

Shows a 1-ton all-nickel (99·9%) autoclave, sunk into the floor, for the extraction of pectin from pomace. It is fitted with a power-operated mixer and can be emptied by compressed air or steam as desired. The water pre-heater tank and grouped control arrangements are also shown.

End of Boil.—The end of the boil is best determined by the skimmer in conjunction with a thermometer. The latter cannot be taken as a reliable indicator of the percentage of sugar in the boil, because it is affected by the degree of inversion and the lack of uniformity of the material. The skimmer is brought into play when the boiler sees by the thermometer that the end is near—*i.e.*, when the thermometer approaches 220° F. In the hands of an experienced man, the skimmer indicates with considerable accuracy the formation of a satisfactory gel. A good jam boiler will "find his jelly" with the skimmer, cut off the steam, and then take his final thermometer reading.

Practical Considerations.

The size of boil is important because it is obviously a means of controlling the duration of boiling without having to cut down steam.

This duration should be long enough to cook and sterilise the fruit and allow sugar to penetrate it, and also to invert about 30 to 40 per cent. of the sugar. This may take 8 to 10 minutes to accomplish, from start to finish, according to the acidity. There

are thus possibilities of shortening the boiling period by using a proportion of invert sugar or by adding a little acid, since inversion usually lags behind the actual cooking.

Care must be taken that, if dry sugar is used, it does not burn on the pan at the start of operations. The ingredients should be thoroughly stirred, and, with small boils, it may be necessary to add a little water or dilute pectinous juice to prevent burning and to keep the boil in the pan long enough to invert the sugar.

On the whole, the object should be to keep the amount of water to be evaporated as low as possible consistent with accomplishing the objects mentioned above. With fairly large boils of 140 or 150 lbs. output, concentrated pectin can be used entirely, and the addition of dilute pectin or water is unnecessary.

For fruits like oranges and apricots which easily show up specks of dirt, etc., it may be necessary to use a strong syrup (66 per cent.) which has been filtered. In this case the output per boil would have to be reduced to allow for the extra water to be evaporated.

The concentrated pectin is usually added near the end, as, although sugar tends to protect the pectin from destruction, there is always some loss through prolonged heating at high temperatures. Sufficient time must, however, be allowed to permit thorough mixing.

Finally, the jam maker is reminded that full advantage should be taken of the natural pectin, flavour, and colour of the fruit. Hence fruit for jam should be in good condition and should be "firm-ripe" or, in the case of gooseberries and apples, slightly unripe—unless red gooseberry jam is being made.

Firm jam with an unbroken surface is not readily attacked by yeasts, although these will grow when stirred into jam containing 70 per cent. of sugar or more.

The Pectin-Sugar-Acid Gel.

The fundamental study of jams and jellies leads one to a consideration of the laws governing the formation of the pectin-sugar-acid gel; a mass of published work is available to anyone who feels disposed to explore this subject. For a useful summary one may conveniently consult Dr. Clayton's *Colloid Aspects of Food Chemistry and Technology* (1932), and there also will be found a number of references to original papers.

The essential point is that jelly formation results only over a definite equilibrium range of the system, and is affected by such factors as temperature and ion concentrations, particularly by that of the hydrogen-ion. It has been shown that a gel can be formed in the cold if the ingredients are mixed in the right proportions. Also, gels can be formed with glycerine or with sugars other than sucrose.

FIG. 2.

Pulping machines in foreground and a rear view of the autoclave, etc., shown in Fig. 1. Also seen are two filter presses and a hydraulic press for pectin extraction (this is shown more clearly in Fig. 4).

FIG. 3.

A complete charging unit, consisting of four nickel tanks, one for syrup, one for invert sugar, and two for sugar. It will be seen that the tanks are charged from above by compressed air or steam.

The whole arrangement is controlled by one girl, who keeps the tanks filled, and fills from the larger tanks the four smaller ones on the scales. These latter empty into a trough which feeds the "montejus" or blowing egg below. The contents of the montejus are blown, either by air or by steam, up to the boiling pans, where they come under the control of the jam boiler. This arrangement ensures that a charge is always ready for the jam boiler and the pans.

and this is probably the reason why inversion does not materially affect the gel.

If the percentages of pectin and sugar in the mixture of pectin, sugar, and acid are kept constant and the acidity varied, the strength of the gels formed increases to a maximum with increasing acidity and then decreases with further additions of acid. This occurs with both hot and cold gels. The maximum gel is formed at a *p*H of about 2·45 for the complete mixture or 3·1 for the pectin-acid mixture only before the addition of the sugar.

If the pectin and acid are kept constant, the maximum gel is obtained with about 68 per cent. of sugar. Too high a sugar content results in sticky gels.

It is claimed by some authorities that the precipitate with alcohol is a gel similar to the gel with sugar; in fact, it is thought that the sugar gel is merely a precipitation phenomenon, a view that is supported by the fact that dry, powdered pectin is insoluble in a saturated sugar solution.

"Syneresis" or "weeping" is caused by excessive acidity. The judicious addition of salts, which act as buffers, has been found useful in preventing this condition. Another defect in jelly formation is the broken or granular texture, which is thought to be due to the premature setting of the gel around particles of undissolved sugar. These lumps form before the mixture is hot and do not disappear during the subsequent heating. A similar granular condition is caused by premature disturbance of a jelly during cooling—thus the jelly may form before the material can be filled into jars. It is important to remember that jam or jelly should not be disturbed after it has begun to set.

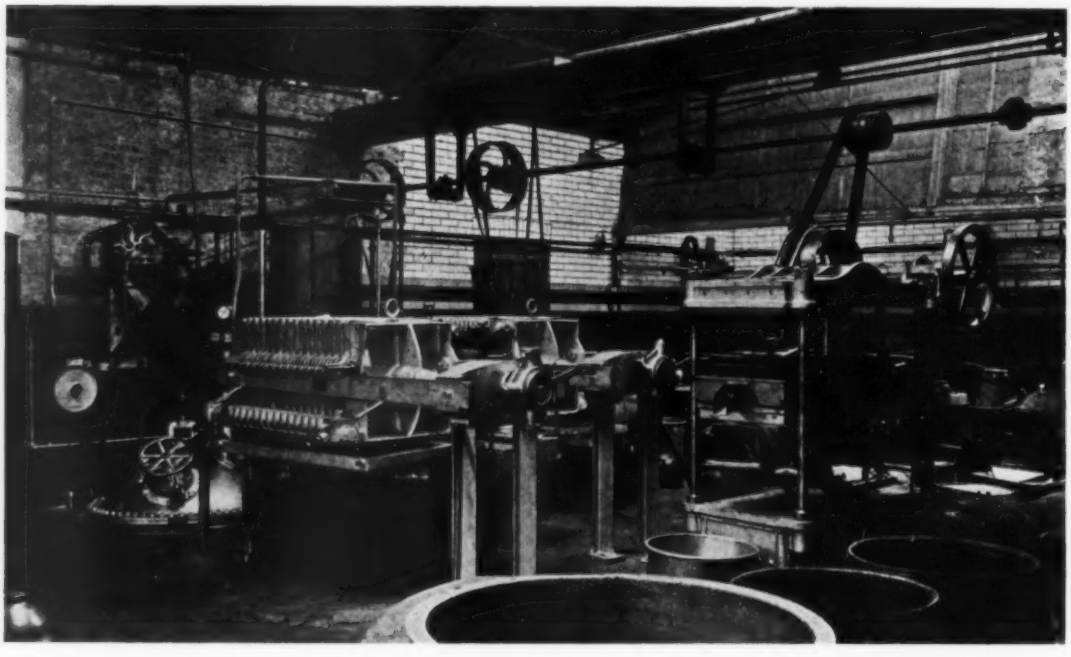


FIG. 4.

Showing another view of the lay-out.

(Figs. 1-4 have been reproduced by courtesy of Messrs. Brierley, Collier and Hartley, Ltd., and Newbery Bros., Ltd., of Battle, Sussex.)

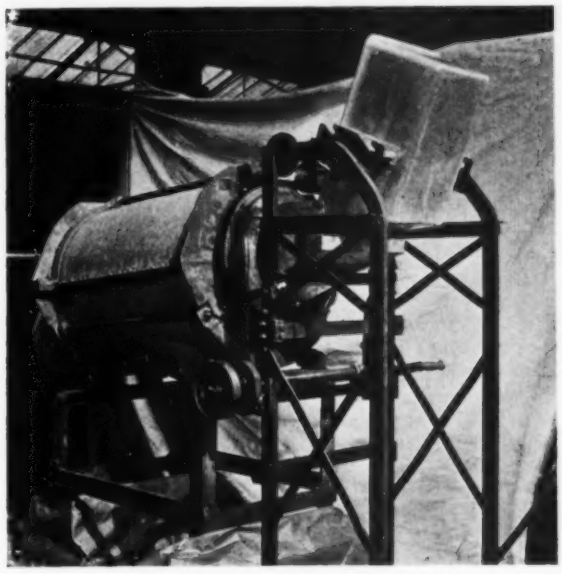


FIG. 5.—Rotary Jam Cooler.

The rate of cooling and the temperature of the jam for potting are both under control. The photo shows a charge of jam in a bogie container being mechanically tipped into the cooler.

(Courtesy of the Aluminium Plant and Vessel Co., Ltd.)

Pulp

There are several ways of preserving fruit in the form of "pulp" for subsequent manufacture into jam.

By Heat.

Jam makers still preserve for their own use a considerable amount of fruit, such as plums and oranges, which has been boiled with a minimum of water, passed through the pulping sieves, and filled into large bottles fitted with metal caps. This is fairly safe and economical, as the bottles can be used over and over again, and with care they last quite a long time. Barrels were formerly used extensively, the fruit being filled into these through the bung-holes while practically boiling. The barrels were then tightly bunged and rolled. This method of preserving pulp was always risky, as it is difficult to store barrels over a long period without some leaks, and consequent infection by yeasts, occurring. The same risk attached to large stone jars closed by corks.

By Sulphur Dioxide.

The addition of sulphur dioxide or sulphurous acid is the method of preservation most in favour at present owing to its cheapness. According to the regulations, 5 grains per lb. of sulphur dioxide are permitted in fruit pulp and 0·3 grain in the finished jam. There is, however, a movement on foot towards permitting an increase in these quantities, since it is difficult to keep strictly within the limits.

The usual procedure is to buy the sulphurous acid as a 6 per cent. solution. This is suitably diluted and added in measured quantity to the fruit as it is being filled into 40 or 50 gallon casks. The casks are tightly bunged and well rolled to mix the contents thoroughly, and they may then be stored in the open air with occasional inspection to see that there are no leaks; if these occur, a little SO_2 solution should be added.

Red colours are almost completely bleached, but blues, yellows, and greens are little affected. Most of the colour returns on boiling for jam, and the SO_2 is driven off almost completely. It may be necessary to add a little artificial colour to strawberries which have been treated with SO_2, but this is rarely required with raspberries.

Sulphur dioxide can be used by the *fruit grower* when the fruit is quite fresh; it immediately checks enzymic action.

Sulphur dioxide has a tendency to harden the skins of currants etc.; this may be prevented by cooking, cooling, and adding the SO_2 to cold pulp.

It should be remembered that sulphur dioxide cannot be used for fruit intended for canning.

Frozen Pack for Jam

This subject is dealt with in the F.I.B. Annual Report for 1931, shortly to be published. In the matter of cost, freezing can hardly compare favourably with the sulphur dioxide method of preservation; on the other hand, it is probable that, generally speaking, the quality of jam made from frozen pack fruit is a little higher, although excellent jam can be made from fruit to which sulphur dioxide has been added.

The procedure adopted depends largely on the fruit. Strawberries, for example, are mixed with an equal weight of sugar in barrels, rolled or stirred frequently in a cool place until the sugar is dissolved, and then sharp-frozen at 0° F. They may then be stored at

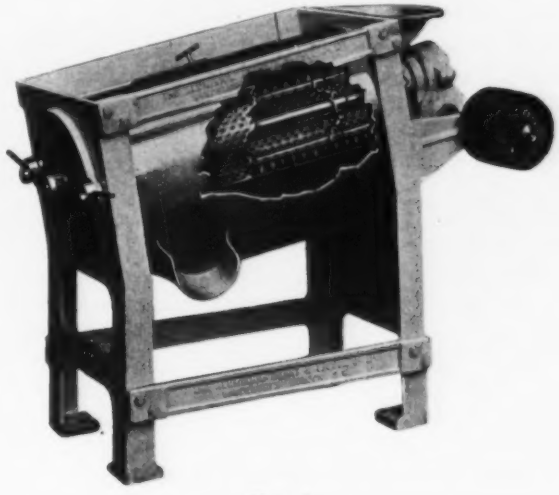


FIG. 6.

Pulping and Sieving Machine of Aluminium or Stainless Steel.

(Courtesy of the Aluminium Plant and Vessel Co., Ltd.)

14° F.; somewhat better results are obtained by storing at 0° F. If desired, a strong syrup (50 per cent. or more) may be added instead of dry sugar. The writer advocates freezing in vessels of wood or, better still, in vessels of non-corrodible metal of a convenient shape and large enough to hold sufficient fruit for one boil, so that there is not the same difficulty experienced in keeping the proportions of fruit and syrup right as there is when a barrel is thawed which contains enough fruit for several boils.

Raspberries and loganberries, blackberries and currants can be frozen without sugar, but plums and cherries should be partly cooked before being frozen, so as to destroy the enzymes which cause browning.

At present, however, these freezing processes are not of much practical interest to the average jam maker who is satisfied with the sulphur dioxide method. Nevertheless, should the latter method become unpopular for any reason, the frozen-pack process will come to the front. Doubtless the relative positions of the two methods of treatment will be also changed as further improvements are made in the freezing process.

Manufacture of Macaroni

MACARONI and products of a similar type (spaghetti, vermicelli, shelloni, etc.) are prepared from semolina mixed with flour and formed under pressure.

After sifting to remove impurities, the semolina and flour are mixed with the water in a machine consisting of a metal tub equipped with a beater arm which revolves on a horizontal axis. The macaroni dough at this stage is comparatively dry and crumbly. Next, the dough is transferred to a kneading machine —a large flat-bottomed shallow rotating pan fitted with two conical corrugated rolls of cast iron. The rolls can be adjusted to varying heights from the bottom of the pan and the dough is directed under them by two "ploughs." The kneading process is very important, as it completely changes the structure of the dough to a stiff, homogeneous, plastic mass, creamy yellow in colour and almost translucent in thin layers. The kneaded dough is cut into convenient lengths and loaded into a vertical hydraulic press. At the lower end of the cylinder, which is about 6 ft. from the floor, is a multiple die through which the macaroni extrudes, under a pressure of 3,000 lbs. to the square inch, in the shape of the familiar tubes. The 6 ft. lengths of macaroni are snipped off and looped over rods, which, when full, are arranged on a cast-iron frame and transferred to the curing rooms.

Curing is a very delicate process, and in modern plants elaborate arrangements are employed to control the temperature and humidity of the curing room. The drying or curing process removes 30 per cent. of water from the moulded macaroni without altering its shape. If the rate is too rapid the macaroni tubes crack and disintegrate, while if the moisture evaporation is too slow the macaroni sours and becomes mouldy. The total curing time in a modern plant is 48 hours, and air circulation is assisted by fans. For the first half-hour of the drying period, the macaroni is subjected to hot dry air, circulated at a high speed, for about 20 minutes, and in this period 5 to 6 per cent. of the total weight is removed as moisture. The macaroni next remains for two hours in a drying room in which no air circulation is employed, and here such moisture as remains in the macaroni is distributed evenly over the surface and throughout the body of the tubes, which, from being "case-hardened" and brittle when they left the fanning room, again become plastic.

The macaroni is again passed through the fanning chamber and returns to the drying room as before, and after a stay of similar length the cycle is repeated. Usually three or four trips through the fanning and drying rooms are required before the macaroni is completely "cured."

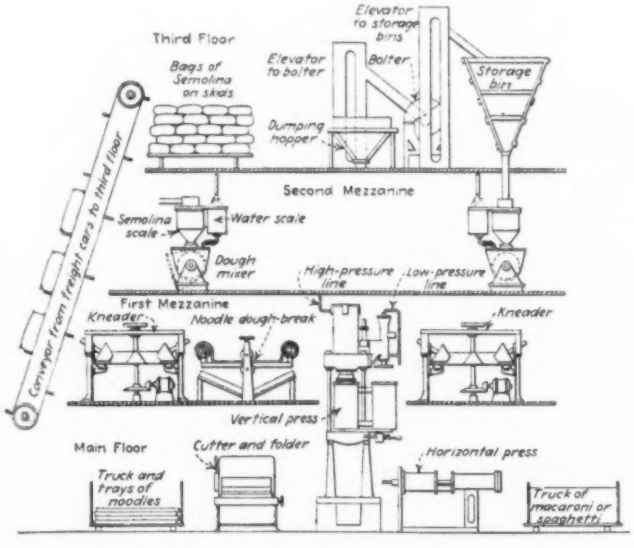


Diagram showing Layout of the Fontana Macaroni Plant.

(Acknowledgment to "Food Industries.")

The macaroni is cut into lengths by rotary knives and packed in waxed paper-lined cartons.

Practical Jam Making

By JOHN ELSBURY

IT IS essential, in the first place, if good quality jam is aimed at, to see that the fruit and sugar are of good quality, and that a suitable jam boiler (both man and pan) and plenty of steam are available.

The sugar should be made into a syrup by, for example, placing half a ton of water and one ton of sugar in a large steam tank and dissolving. Any scum should be removed and the solution filtered. This procedure will obviate stirring the jam in the pan, except to a minor extent towards the end of the boil.

Strawberry Whole Fruit.—By way of an example, the following recipe may be quoted:

Syrup (prepared according to the above directions)	98 lbs.
Strawberries	50 lbs.
Green gooseberry juice	1½ gals.
Output of jam	112 lbs.

Boil to 223½° F.

Probably the amount of gooseberry juice would have to be increased as the season advanced. The strawberries must be well washed in cold water before putting in the syrup.

Raspberries make better and brighter jams by being run through a pulping machine in a raw condition.

Stone Fruit will make better jam of good keeping quality by being boiled in water before adding to the syrup; this releases the pectin from the tissues.

Black Currants (for whole fruit jam) must first be boiled for 20 to 30 minutes and then put into a light syrup and allowed to remain there for 10 to 12 hours. This softening can also be done in an autoclave at about 10 lbs. pressure. By this means the production of hard fruit will be avoided. The following procedure is suggested:

Black currants	50 lbs.
Water	3 gals.
Gooseberry juice	3 gals.

Gently simmer for 20 to 30 minutes, after which add half the total amount of syrup—*i.e.*, 49 lbs.—and just bring to the boil. Then place the whole in a tub and allow to stand until the next day. Return to the pan, add the rest of the syrup (49 lbs.), and boil to 222½° F. If gooseberry juice is used, this should always be uniform in character.

Gooseberry Juice.—Prepare as follows:

Green gooseberries 16 ¼-sieves ...	about 462 lbs.
Water	15 gals.

Place in an open steam vat and steam until the fruit is well cooked. This should yield 120 gals. of juice.

Some Useful Points.—Pectin may, of course, be used instead of gooseberry juice.

Excellent results may be obtained by the use of raw lemon juice, say 1½ pints to 112 lbs. of strawberry jam.

For inferior quality jams, less fruit than is given in the above recipes may be used.

Brighter and better colour is secured by cooling the jam before filling. This may be done by running down chutes or by water cooling, but care must be taken that the amount of rubbing is minimised, otherwise there is danger of granulation.

Jams from Pulp.—All the pulp must be brought to a uniform standard in order to be able to incorporate the correct proportion of sugar. In the case of raspberries, blackberries, and red currants, the fruit in a raw condition is put through the pulping machine, after which it is just brought to the boil. One gallon of the pulp is estimated as being equivalent to 10 lbs. of the fruit.

Strawberries are best boiled with half the amount of syrup to 220° F. One gallon of pulped stone fruit is taken as equivalent to 7 lbs. of the fruit.

Pulps for Jam Making.

Raspberries, Blackberries, and Red Currants.—Run the raw fruit through the pulping machine. Then transfer to the pan and bring to the boil.

See that the jars, or casks, are clean and sound. Stand them over an open steam-pipe and heat them up gently before filling them with the hot pulp. It is important that filling is done when the pulp is boiling hot.

In the case of jars, these are corked, after which the cork and the top of the jar are given a coat of glue; then stick on a piece of calico, followed by another coat of glue. It is advisable to store away the jars while they are hot.

By using small casks for raspberries and red currants a better colour is obtained. One can use a little SO_2 in the cask, but care should be taken not to use too much; ½ oz. of 5 per cent. solution is ample for each gallon.

Stone Fruits.—The pulping of stone fruits may be carried out in several ways. For example, 5 cwts. of plums are steamed in the vat to make 80 gals.—i.e., 7 lbs. to the gallon. Fill into casks as hot as possible. The amount of SO_2 used should be ½ oz. to each gallon of pulp.

Pulping Fruits in the Field.—For each 40-gal. cask of raw raspberries use 1½ gals. of a 5 per cent. solution of SO_2 mixed with 2 gals. of cold water. First put one-third of the total quantity of raspberries into the cask and add one-third of the SO_2 solution. Then add another one-third of the raspberries, followed by a second addition of SO_2 solution amounting to one-third of the total bulk. Finally, add the rest of the raspberries and the preservative. Well cork or bung the cask, the latter being preferable. Now give the barrel a roll in order to mix the contents.

This practice is suitable for strawberries, cherries, and stone fruit generally. In the case of stone fruit, however, hot water must be used, otherwise the product will be too hard. Black currants cannot be treated by this method, as they turn out far too hard. Some kinds of apples are amenable to this treatment, but, generally speaking, all pulp made this way should be prepared under expert supervision.

Manufacture of Pectin

An outline of the principles involved. Reference should be made to Figs. 1, 2, and 4 on pp. 134-136 for illustrations of modern plant used in connection with pectin manufacture.

THIS SUBJECT is dealt with by W. A. Rooker in his book *Fruit Pectin* (New York, 1928); he cites the numerous patent specifications. W. Clayton in his *Colloid Aspects of Food Chemistry and Technology* (London, 1932) also gives much information, and quotes references to literature, such as Wilson (*Ind. Eng. Chem.*, 1925, xvii., p. 1065), Poore (*U.S. Dept. Agr., Dept. Bull.*, 1323, 1926), Myers and Baker (*Univ. Delaware Agr. Exp. Bull.*, 160, 1929), Nelson and Mottern (*Fruit Prods. Jour.*, 1931, x., p. 138).

British readers are advised to look up the case of Douglas *v.* Evans.

Pectin is present chiefly in fruit and vegetable pulp, mainly in the insoluble portion or "mare"; little occurs in the juice. Wilson gives the following particulars concerning its occurrence in certain raw materials:

Material.	Per Cent. Pectin in Fresh Material.	Per Cent. Pectin on Water-free Basis.
Apple pomace	1·5 to 2·5	15 to 18
Lemon pulp ...	2·5 to 4·0	30 to 35
Orange pulp ...	3·5 to 5·5	30 to 40
Beet pulp ...	1·0	25 to 30
Carrots ...	0·62	7·14

Up to about ten or fifteen years ago pectin was added in unconcentrated form as an extract from apples, green gooseberries, or even from lemons. Such an extract contained from 0·6 to 0·8 per cent. of pectin, and anything from 2 to 3 gals. of it were used for an output of about 100 lbs. of strawberry or raspberry jam. Later, an extract was made from apple pomace, which contained 0·8 to 1 per cent. of pectin. More recently it is the practice to clarify the extract by filtering with kieselguhr free from iron, removing the starch and proteins by starch- and protein-splitting enzymes, decolorising by carbon, concentrating to about 4 or 5 per cent. of pectin, and acidifying so as to give the maximum gel strength when diluted again and mixed with sugar. Such a product is on the market and gives a clear and tasteless jelly.

In the process of manufacture the following points should be taken into consideration:

The pomace (or other raw material) must be of good quality, and must be carefully tested before buying. Pomace is prone to deteriorate on storage.

It is a good plan to leach the pomace with cold water before extracting; this removes sugars and a good deal of colouring matter.

Extract the pomace by boiling gently for about half an hour (the time depends to some extent on the quality of the pomace) with about ten times its dry weight of water, containing 0·2 to 0·3 per cent. of citric or tartaric acid. Some authorities recommend a lower temperature for a longer time, but it is questionable if any particular advantage is gained.

Press the extract from the solids by hydraulic presses. The cake on the press is sometimes worth a second extraction, but never a third.

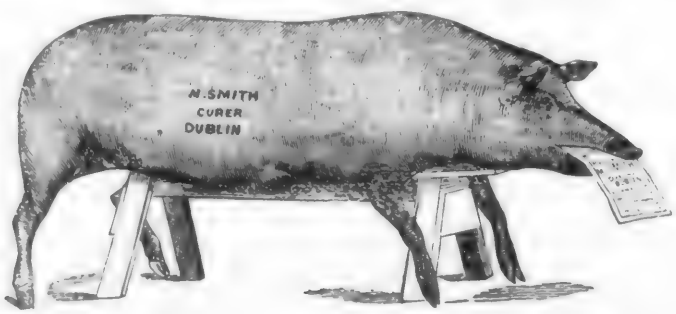
Some authorities cool the extract at this stage and remove the starch and proteins by enzymes. They claim that this makes clarification easier; there is, however, not much difficulty in clarification if care is exercised in selecting kieselguhr.

After de-starching, etc., add kieselguhr and a decolorising carbon, and boil or heat for a short time. Filter through a filter press.

Some prefer to de-starch after clarifying. So little of the enzyme is necessary for this that the effect on the brilliance is negligible for most purposes. If the operation is carried out here, it is very rapid and requires a minimum of enzyme, since much of the starch, etc., is removed by filtration.

Concentrate in a suitable evaporator in which there is no possibility of metallic contamination.

Powdered pectin may be made by the method of Wilson. It may also be precipitated from the extract by adding twice its volume of acetone or alcohol; either concentrated or unconcentrated extract may be used, but usually the former is favoured, as it involves less precipitant. Possibly it might be cheaper in the end to rectify the larger quantity of spirit required for a 1 per cent. extract, rather than to concentrate this. Acetone has the advantage of a low boiling-point, which makes it easy to recover and rectify.



Smith's Preserved Pig shown at the Great Exhibition of the Industry of all Nations held at the Crystal Palace in 1851.

Food Regulations in U.S.A.

A Model which Might be Followed

An English food chemist who is now manufacturing in U.S.A. writes: "In view of the interest displayed in your journal from time to time in the subject of food legislation, I am venturing to submit a few observations on the system in operation over here."

This article serves to contrast the carefully planned and coherent American system with the individualistic, confusing maze of regulations which exists within the Empire. Another important point is the great help which American manufacturers derive from the establishment of definite standards and uniform methods of testing, and, in consequence, they are less liable to find themselves at the mercy of varying interpretations of the law.

IT CAN safely be said that food products in the U.S.A. are subjected to more effective supervision during manufacture and distribution than those in any other country.

In the first place, all products imported into the country or entering into inter-State commerce—*i.e.*, made in one State and sold in another—are subject to the regulations of the Federal Authorities. Furthermore, as the individual States by virtue of the Constitution of the United States have sovereign rights within their own boundaries (which rights are jealously guarded), each State makes regulations of its own with which all food products manufactured or sold in the State must comply. In addition, the larger cities and municipalities have stringent regulations, backed up by inspection services, governing the operation of milk bottling establishments, meat slaughtering, and baking, and, in many cases, ice-cream and soft drink businesses. Some industries, such as the butter and oleomargarine manufacturers, have been subjected to special legislation.

Any food product containing meat, such as soup or potted meat, must be manufactured under continuous Government supervision, an inspector of the Bureau of Animal Industry being present in the factory at all times. All ingredients and equipment used in the manufacture of these products must be approved by the Bureau, which also approves the design and wording of the labels. Nevertheless, despite the apparent complexity of these systems of supervision and regulation for the average manufacturer of food products sold to the grocery trade the problem is rather simplified by the fact that under the auspices of the Food and Drug Administration of the Federal Government fairly definite standards and methods of analysis have been built up.

Food and Drugs Act.

The passage of the Food and Drugs Act of June, 1906, marked the beginning of the present system. This Act was the result of the vigorous campaign conducted by the late Dr. Harvey W. Wiley in the early part of the century, designed to remedy some of the abuses which had developed in certain industries. It was held that some food products then on the market might be definitely injurious, due to the use of inferior materials possibly disguised by the addition of colouring and preservatives, while other products were regarded as deceiving the purchaser by reason of misleading labelling. This Act was drawn up with the aim of protecting the consumer's health, by preventing the use of poisonous or deleterious ingredients, and protecting his purse by insisting on proper labelling so that he could be sure that he was buying what he paid for, not only in quantity, but also in quality.

THE POSITION WITHIN THE EMPIRE

Immediate steps should be taken to bring into closer agreement regulations relating to manufactured foodstuffs which are in force in the various countries of the Empire.

At present the lack of harmony and cohesion is unreasonably great, thus leading to confusion, which in turn constitutes a hindrance to the interchange of manufactures.

In particular, uniform standards are desirable for permitted preservatives and colours, labelling requirements, and definitions of food products.

The standardisation methods of testing and analysing foodstuffs would also assure manufacturers that foods acceptable to the authorities of one country would not be rejected by those of another.

FOOD MANUFACTURE *has already brought these proposals to official notice. Indications of support from our readers throughout the Empire will add considerable weight.*

A certain amount of opposition to the Act was experienced in the early days, but responsible manufacturers soon realised that the law was of benefit to them as well as the consumer by prohibiting the manufacture or sale of adulterated or misbranded products. The result is that at the present time the food law is respected and obeyed to a degree which compares most favourably with the record of most other laws of the United States.

The procedure of the Food and Drug Administration, which is responsible for the enforcement of the Act, has aided materially in attaining this satisfactory observance. A policy of co-operation with the manufacturers, backed up by education of the consumer, has been adopted, gradually developing an increasingly higher standard of purity, wholesomeness, and sanitary manufacturing conditions.

Preservatives.

Very definite regulations have been made regarding preservatives, which must be plainly declared on the label when used. Benzoate of soda (or benzoic acid) and sulphur dioxide are the only permitted preservatives at the present time, the former being used in products such as sweet pickles and sauces, cheap grades of jams, jellies, and mincemeat, sweet cider and other beverages in amounts up to two-tenths of 1 per cent.; while sulphur dioxide or its compounds may be used in ordinary quantities generally accepted as up to 350 parts per million in products such as dried fruits and certain beverages or pickles. Colours and preservatives, of course, may not be used to mask the employment of inferior or deleterious ingredients.

Colours.

Colouring materials which may be used are harmless vegetable colours, cochineal, and a limited number of coal tar dyes. These dyes, which number fifteen at the present time, have been shown by careful Government investigation to be without harmful effect, and are manufactured under Government supervision. Each batch must be certified by the Federal Authorities before it can be sold to the manufacturer. Wherever colours are used in a food product, except confectionery, their presence must be stated on the label.

As a certain amount of suspicion appears to be attached to the use of colours, many products which in England are sometimes touched up with a little colour to make them more attractive in appearance, such as jams, canned fruit and the like, are sold in the United States without any added colour. There is no doubt that the necessity for a label declaration where preservatives and colouring matter are used has been a direct incentive to the manufacturers and food technologists to develop methods of selection and handling of raw materials and packaging of finished products which will avoid the use of colours or preservatives as far as possible.

Definitions and Standards.

Of greater interest to the average manufacturer are the series of definitions and standards for food products which have been developed. These standards, which cover a fairly complete range of fruit and vegetable products, milk and meat products, condiments, beverages, and other food materials, have usually been worked out by committees representing the manufacturers and the enforcement officials.

A typical definition is that for tomato catsup, which is defined as the clean, sound product made from the properly prepared pulp of clean, sound fresh ripe tomatoes with spices and with or without sugar and vinegar. Wherever possible, definite chemical or physical standards of composition are given; thus sweetened condensed milk is defined as the product resulting from the evaporation of a considerable portion of the water from milk to which sugar has been added. It contains not less than 28 per cent. of total milk solids and not less than 8 per cent. of milk fat.

In general, where a list of ingredients is given for a manufactured product, these are considered the normal ingredients for that product and no others may be used—*e.g.*, unless starch is mentioned in the definition, no starch may be used in making the product.

Although these definitions play an important part in the administration of the food law, they do not in actual fact form part of the law (although legislation is at present being prepared to give them the force of law) and are subject to revision as the occasion demands. Thus the definition for mayonnaise originally adopted in 1929 specified not less than 50 per cent. of edible vegetable oil, and that the sum of the oil and egg yolk is not less than 78 per cent. This has now been revised to read not less than 50 per cent. of edible vegetable oil, and the Mayonnaise Manufacturers' Association is pressing for further revision.

Fruit jam or preserves is defined (essentially) as the clean, sound product made by cooking to a suitable consistency 45 lbs. of fruit and 55 lbs. of sugar. The jam manufacturers, through the agency of the National Preservers' Association, are urging for a definition which will permit the use of pectinous materials with fruits where the natural pectin is deficient, provided that the necessary ratio of fruit to sugar is maintained and that the finished product contains at least 68 per cent. total solids, so as to prevent "stretching" of the jam by the use of pectin.

Recently a law, known as the McNary Mapes Act, has been passed which authorises the department to set standards of quality for all canned foods, and this has led to considerable discussion between the Government and the manufacturers in attempting to evaluate the various factors which determine the quality of a canned food.

Inspection.

Naturally enough, with the large area and multiplicity of products over which the enforcement

officials have supervision, it is not possible to inspect every shipment. However, a force of inspectors is maintained with the right to enter at any time any establishment where food products are handled, particularly those of a seasonal nature. If inspection shows that due to weather or other conditions the products of a certain district are likely to be below standard, special effort is concentrated on the examination of products from that district. Similarly, if inspection shows that certain practices are becoming common in the trade, which do not meet the approval of the authorities, special attention is given to the products made in this way until the abuses are remedied.

It sometimes happens that due to climatic conditions in certain regions the tomatoes from that district may be particularly susceptible to mould and decay during that season. By the determination of the "mould" count of the manufactured tomato catsup or pulp, the authorities can determine if sufficient care has been given to the question of sorting and trimming of the tomatoes and the prevention of the shipment of contaminated materials. Occasionally diseases have appeared among the tuna fish or herrings during the packing season, and by co-operation between the State authorities, the canners, and the Federal authorities, all doubtful material has been eliminated before the product reaches the public. In addition, the Federal authorities follow up all cases of food poisoning, and in general take action wherever food products come to their attention which are likely to be injurious to the public health, or are made from inferior materials, or are likely to deceive the prospective purchaser.

Labelling.

Definite standards are not available for all food products, and it is generally advisable, in case of doubt, to confer directly with the authorities regarding the labelling of a product, particularly an imported product. Many products which are well known in England must be sold under another name in the United States. The usual type of custard powder must be named dessert powder and give a list of ingredients, as it is held that custard must contain eggs. Jellies are regarded as made from fruit juice and sugar only, and the jelly crystals or tablets are usually sold under distinctive trade names.

Meat pastes must be labelled to show the meats present, listed in the order of their proportions in the paste (chicken and ham must be made from chicken and ham only, with more chicken than ham), and cereal cannot be used in potted meats without a label declaration. Saccharin cannot be used in food products even if declared on the label.

State Laws.

In addition to the Federal laws, the laws of the individual States must be considered. Although these are based in the main on the Federal laws, yet in some cases they differ materially. Several States prohibit entirely the use of sulphur dioxide except in dried fruits, and others prohibit the use of certified colours, except for confectionery, even if declared on the label. Pennsylvania sets a particularly high standard—*e.g.*, it sets a definite tomato solid content for catsup which the Federal authorities have not yet adopted. California exercises a very strict supervision of the canneries in the State, insisting on the use of recording thermometers giving a record of each batch of fruit or vegetables canned.

Standardised Analysis.

In addition to standards of composition, standardised methods of analysis have been developed, in this case by the Association of Official Agricultural Chemists, an organisation composed of all chemists connected with the Government or State agricultural or health departments. These methods are adopted after careful investigation of those available, and, although there are always critics of the methods advocated, it is very difficult in the eyes of the law or official opinion to obtain any credence with results obtained by unofficial methods.

This uniformity of analytical procedure is, of course, very helpful to the manufacturer and the officials in ensuring conformity to the standards of purity and composition.

New Food Machinery Developments

LAST month we announced an event of first importance to the British food industry—the association of the Food Machinery Corporation, California, with Messrs. Mather and Platt, Ltd., in the formation of a new British company with the probable title of "Food Machinery Mather and Platt, Ltd." It is understood that Mr. Mather will be chairman of the board. The Food Machinery Corporation will hold an interest in this new company, which will thus be in the fortunate position of being able to draw on the vast resources of experience and knowledge accumulated by the American company in every part of the world. In addition, it will have at its disposal the worldwide marketing organisation of Mather and Platt. Plant for use in the United Kingdom will be built in Manchester, incorporating, of course, both British and American designs; as regards plant for Empire countries, most of it will be British built, but much will depend on the character of the plant required and the conditions under which it is to operate.

There is not the slightest doubt that this pooling of resources is going to be of incalculable benefit to the canning industry in every part of the Empire. As a first step we are expecting to see the introduction into this country of some interesting developments in pea and soft fruit canning plant.

RICE CULTIVATION and TREATMENT

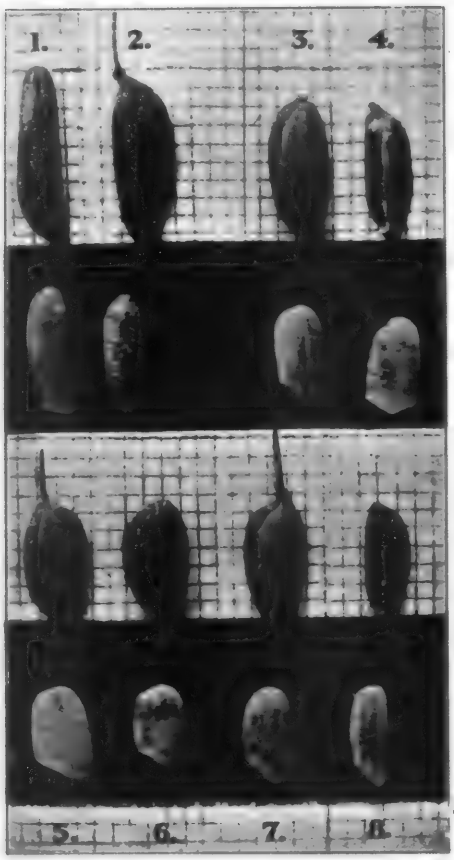


FIG. 1.– Eight Typical Varieties of well-known Rices.

The top and the third rows are Paddy, the second and fourth are shelled rice. The varieties are: 1, Seeta (India); 2, Uganda; 3, Lower Burma; 4, Java; 5, Egyptian; 6, Spanish; 7, Manchuria; 8, Upper Burma.

(Reproduced by kind permission of the Controller, H.M. Stationery Office, from a report to the Empire Marketing Board on The Cultivation, Treatment, and Prospects of Rice in British Guiana, by C. E. Douglas (E.M.B., 32).

ALTHOUGH THE staple diet of nearly half the world population, probably less information has been published on the culture and preparation of rice than any other cereal. Mr. C. E. Douglas has, therefore, rendered valuable service to the food industry by presenting an exhaustive paper before the Royal Society of Arts on May 14, 1931, and three important reports* published in 1929 and 1930, which embody some of the results of his wide experience and from which the following notes are taken:

There are literally thousands of varieties of rice, but, commercially and generally speaking, the world's markets demand three standardised types which may be classified as follows:

Japanese.—An almost round, barley type of grain cultivated in Japan, Spain, and Egypt.

Patna.—A relatively long, thin, cylindrical grain; Siam rice is rather similar.

American (Carolina).—In form this is intermediate between the Japanese and Patna types.

Typical varieties of common rices are shown in Fig. 1.

Cultivation.—The essentials for culture are plenty of water, an impervious subsoil, and an adequate temperature. The land is ploughed and harrowed in early spring—ploughing usually being done, as far as Eastern cultivators are concerned, by oxen, though the use of tractors and light mechanical ploughs is slowly spreading—and the young rice seedlings, four or six weeks old, are transferred from the nursery beds to the main fields, which have

* "*Report on the Cultivation and Preparation of Rice in Egypt.*" (A Report prepared by request of the Egyptian Government.)
Report on the Cultivation, Treatment, and Prospects of Rice in British Guiana. (A Report of the Empire Marketing Board, August, 1930.)
"Rice Cultivation and Treatment," *Tropical Agriculture*, vol. vii, No. 7, pp. 175-179, 1930.

FIG. 2.—Levelling Rice Fields in Egypt.

FIG. 3.—Sowing Rice Broadcast in Egypt.

FIG. 4.—A Young Rice Field in Egypt.

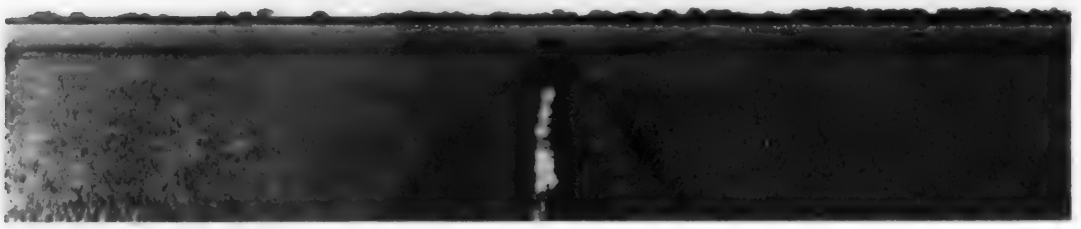


FIG. 5.—A Good Field of Rice in Egypt.

been levelled and flooded to the extent of five or six inches (see Figs. 2, 3, and 4). After a period extending in various countries and according to the varieties grown, from 80 to 200 days the rice is mature and ripe for harvesting, and the water is accordingly drained (see Fig. 5) from the fields for about a fortnight prior to reaping, in order to harden the ground.

In America reaping is done by machine, but by far the greater part of the world's production is harvested by hand.

Thrashing.—After reaping, the grain is thoroughly dried; then it is thrashed and the thrashed grain is termed "paddy." Primitive methods are still largely used (for examples of which see Figs. 6 and 8), but are being gradually replaced by properly designed mechanical thrashers, which also serve to remove a fair proportion of dead grain and rubbish. .

Parboiling.—In India, Ceylon, and British Guiana, or wherever rice is grown for East Indian consumers, the paddy is given a preliminary "parboiling" treatment to toughen the grain and to facilitate shelling.

The paddy is first steeped in warm water for a period varying from 20 to 30 hours, and, after draining, is then subjected for a period of 10 to 15 minutes, to the passage of low-pressure steam. The sodden grain is then spread out on concrete floors and exposed for a day or two to the heat of the sun, which dries it uniformly (see Fig. 9). It is then ready for milling.

According to Mr. Douglas, rice so treated withstands the strain of milling much better and is more sustaining than the white rice of European and Western commerce.

Shelling and Winnowing.—The primitive methods consist in pounding the paddy in a mortar, either by hand or some mechanically operated contrivance; one of these resembles a stamp mill used in the crushing of gold ores. The miller may then toss the material into the air to affect a rudimentary form of winnowing (Fig. 7). It is not generally known that in Burma, French Indo-China, and Siam there are probably hundreds of mills each treating several hundred tons of paddy per day; in fact, in the two first-named countries there are mills each capable of treating 1,000 to 1,500 tons of paddy per day! In these latter, of course, modern cleaning and milling

FIG. 6.—A Primitive Method of Threshing (Egypt).

FIG. 7.—Native Method of Winnowing Rice after Threshing.

FIG. 8.—A Threshing Floor at a Monastery in Cyprus.

equipment is installed which is steam-driven, the fuel being obtained solely from the rice husk.

Modern practice of removing the husks from the paddy consists in putting it through a disc sheller of the type illustrated in Fig. 11. Essentially this consists of an upper fixed disc and a lower rapidly rotating one. Both discs are coated with a mixture of emery and cement, the paddy being fed through a hole in the upper disc.

Even after this treatment the rice consists of shelled grain mixed with a fair proportion of unshelled grain and husk. This heterogeneous mixture is first separated in a winnowing machine to remove the husk, while the shelled and the still unshelled paddy are treated in a special machine which separates the one from the other. The unshelled grain is returned to the sheller, the shelled grain goes to the pearling machine, while the husks, as stated above, are burnt as fuel.

Often the shelled rice at this stage is shipped without further treatment as brown or "Cargo" rice (or "Loonzain") to Europe and America for further treatment, on the spot, to the degree of whiteness which the particular locality requires.

Pearling or Whiting.—After shelling to remove the husk, the grain is "whitened" by removing the cuticle (which lies beneath the husk and surrounds the kernel) in a series of abrading machines by attrition between a rapidly revolving iron cone—covered with a mixture of emery and cement—and a stationary wirecloth casing. The cuticle is rubbed off the kernel and passes through the meshes of the wirecloth as meal or bran. It is a most valuable cattle food, as it contains from 16 to 18 per cent. of oil.

The now whitened rice may be and often is passed through yet another cone machine, coated, perhaps, with finer emery and surrounded, possibly, by a lighter wirecloth. Thus the whitening process is con-

FIG 9.—Drying Damp Paddy in Egypt.

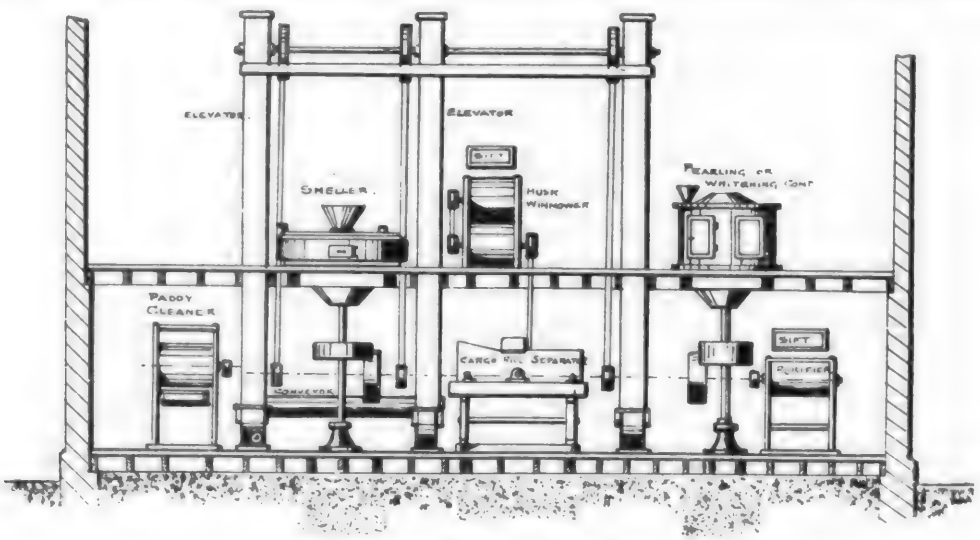


FIG. 10. - Diagram of Typical Rice Mill.
(With acknowledgments to "Tropical Agriculture.")

tinued; by using several cones in series, each lightly milling only a small percentage off the surface of the grain, a high degree of finish can be attained with a minimum of broken rice.

Polishing.—If the polished rice of the European markets is required, the pearled rice is passed through polishers in which the grain is rubbed against fine wirecloth by sheep-skins attached to revolving drums. Occasionally the grain is further steamed and oiled to improve its appearance, or glazed by a mixture of talc and glucose.

FIG. 11.—A Sheller for Husking the Paddy.
(Reproduced by kind permission of the Controller, H.M. Stationery Office, from a report to the Empire Marketing Board on The Cultivation, Treatment, and Prospects of Rice in British Guiana, by C. E. Douglas (E.M.B., 32).

Milling in General.—The modern rice mill approaches closely to the ideal of the Chicago meat-packer in that practically no part of the original grain is lost. Husk, broken rough rice, bran and meal, whole rice and broken white rice are all recovered and bagged for sale in their particular market. Fig. 10 shows the arrangement for a typical rice mill.

Parboiled Rice.—The parboiled or steamed rice, which is not to be confused with the brown or cargo rice mentioned above, is extremely popular with East Indian consumers; it is less expensive and more nourishing than polished rice, although when cooked it closely resembles our normal white rice, the carefully prepared polish of which, it should be noted, vanishes on cooking. It is the parboiled rice which is produced extensively in British Guiana, and Mr. Douglas makes the interesting suggestion that Europeans should be encouraged to consume rice in this form. In many cases a duty has to be paid on imports of polished white rice, whereas less highly prepared rice usually pays none or little duty. It should, therefore, be worth while turning attention to exports of parboiled rice to Great Britain and Europe, where it is practically unknown. According to our authority, it is very nourishing and palatable, while many Europeans who have become accustomed to it when in the West Indies prefer it to any other. A high-grade type of parboiled rice, specially packed and suitably presented, suggests Mr. Douglas, might very probably meet a favourable reception in European countries.

Aluminium in Foodstuffs

IN VIEW of the widespread use of aluminium vessels for cooking purposes, concern has been felt in some quarters as to possible contamination of foodstuffs by this metal. The subject of aluminium in foodstuffs has received attention from G. J. Cox and co-workers at the Mellon Institute of Industrial Research in co-operation with the Aluminium Company of America.

Analytical Method.

In the first of a series of papers (*Ind. Eng. Chem.*, 1932, p. 403), an accurate method for the determination of aluminium in foodstuffs is described. In this method, the foodstuff is carefully ashed, starting with drying overnight at 110° C., followed by heating to a faint red glow in an electric muffle during the day. During the night, ashing is continued while passing a current of oxygen through the muffle. The ash is dissolved in HCl, taken to dryness to dehydrate any silica, taken up again in 10 c.c. 3 M. HCl and 25 c.c. water, and any insoluble matter removed by centrifuging, and washing the residue. The solution is treated with 1 c.c. nitric acid and 1 c.c. 0·1 M. ferric sulphate. Evaporated to 10 c.c. and diluted to 60 c.c. with water, 5 c.c. M. monosodium phosphate and 2 c.c. 0·04 per cent. bromophenol blue are added, followed by I./7. M. ammonia until a precipitate is formed. The *p*H is then adjusted to 4·2 by adding 3 M. sodium acetate. The precipitate of iron and alumina phosphates is removed by centrifuging, dissolved in 0·5 c.c 6 M. HCl and 1·25 c.c. acetic acid with 15 c.c. hot water. 5 c.c. 6 M. caustic soda is added, and after standing the ferric hydrate removed by centrifuging. The liquid is filtered through a double filter paper, washed with warm caustic soda solution and then water. The precipitate is also washed, and the solution filtered through the paper. The filtrates are made up to 100 c.c., adding 1 c.c. of 6 M. HCl. 20 c.c. of the solution are put into a dry conical flask with 25 c.c. of aluminon reagent (1 mole ammonium acetate, 1 mole ammonium chloride, 80 c.c. 0·1 per cent. aluminon, and 60 c.c. 6 M. HCl per litre). The *p*H must now be 4·5 to 5·5. The solution is heated to boil and boiled for exactly 1 min. under a close fitting condenser. When cooled, 1·6 M. ammonium carbonate is added to give a *p*H of 7·1, the flask (stoppered) shaken up and down twenty times, and CO_2 released. After standing 20 mins. with the stopper loosened, the colour depth of the lake formed is compared with a standard of 5 c.c. 0·04 per cent. thymol blue and 8 c.c. 6 M. HCl in 500 c.c. solution in a Duboscq colorimeter, setting the lake solution at a constant depth of 30 mm. and varying the depth of the standard.

The aluminium present is ascertained from a curve obtained by plotting colorimeter readings against varying amounts of aluminium treated in the manner described above.

Aluminium Contents of Food.

In the second and more practical paper (*ibid.*, p. 405), results are given of the aluminium contents of various foods cooked in both pyrex glass and aluminium vessels. It is pointed out that very early results on the corrosion of aluminium cooking utensils are of little value, as they hardly apply to the high grade of metal now employed. Generally speaking, neutral foods attack aluminium to an insignificant degree. Acid or alkaline foods (*i.e.*, cooked in the presence of sodium bicarbonate) do dissolve small amounts of aluminium, and dark vessels yield more soluble aluminium than bright ones. There are also indications that the presence of sugar decreases corrosion.

There appears to be no possibility of phosphorus starvation as the result of ingestion of foods cooked in aluminium vessels. It is calculated that from an ordinary balanced diet, the daily intake of aluminium, assuming all cooking done in aluminium vessels, would be about 12 mgs., or about an average of 4·9 parts per 1,000,000 of Al. in the ration, and of which only 2·1 parts actually come from the utensils. The following figures, in parts per 1,000,000 show the increase in aluminium content due to cooking in the metallic container: Fried bacon 0·43; boiled ham 1·32; roast beef 0·23; creamed chicken 1·39; beef soup stock 0·23; percolated coffee 0·78; potatoes: whole boiled 0, skins removed 0·55; oatmeal 7·24; stewed tomatoes: bright pan 4·16, dark pan 15·3; sauerkraut 15·6; green beans 1·37; beets 0·16; creamed onions 0·61; creamed cabbage: no soda 2·41, with soda 90·5; cranberry sauce: bright pan, no sugar 7·36, with sugar 2·54; dark pan: no sugar 27·5, with sugar 2·70; rhubarb: bright pan 12·5, dark pan 40·9; apricots 48·7; prunes 2·50; apple sauce 1·12; orange marmalade 2·76; lemon pie filling 1·93. In a few cases only, the authors say, were the foods cooked in aluminium vessels slightly affected in flavour as compared with those cooked in pyrex glass.

Vinegar Manufacture

An exhaustive account of Vinegar, its manufacture, properties, uses, etc., is shortly to be published in FOOD MANUFACTURE. *This has been specially prepared by two experienced authorities and will be completely up to date.*

* * *

Fruit Juices.

Readers are reminded that Professor Cruess is preparing his article on Fruit Juices; this promises to be of particular interest, as the material is being collected during a tour of inspection of Californian factories.

* * *

Fish Pastes.

Look out for the article on Fish Pastes in next month's issue.

The Preparation of Frozen and Dried Eggs

FROZEN EGGS can be of two types—the whole mixed eggs, in which the yolks and whites are made into a fairly homogeneous mass by passing through a fine sieve before freezing, and the separated variety, in which the yolks and whites are frozen separately. In either case the egg contents are filled into large air-tight tin cans and frozen solid.

Although absolute freshness is not required, no stale eggs should be frozen. In China the eggs are usually from two to eight days old at the time of breaking, and all the eggs are subjected to a candling test. The breaking is done by hand, usually by female labour, which soon becomes accustomed to the work and attains a high working speed. The eggs are broken by being struck against a blunt knife-edge, mounted horizontally edge uppermost at a height of 6 or 8 inches above a small tray. In the tray are several cups, each capable of holding the yolks and whites of about three normal eggs. A cup is placed beneath the knife and the operator rapidly breaks three eggs on the knife, allowing the meat to fall into the cup below, and then pushes the filled cup from beneath the knife and replaces it with an empty one, with which the process is repeated. When all three cups, or as many as are on the tray, are filled, the operator smells each cup in turn to detect any musty eggs which may have passed the candling test and, if all are fresh, the contents are tipped into a large receptacle placed conveniently at the side. The next stage is the filling of the egg meat into the cans in which they are frozen.

The object of the small cups is to reduce the wastage caused by the inclusion of musty eggs, one of which will quickly taint a canful. As no more than three eggs are broken into each small cup the wastage caused by each musty yolk, if detected at this stage, can be no more than that of two sound eggs.

If the yolks and whites are to be separated, a perforated tray or cup is fixed an inch or two below the knife. On breaking, the yolks are not damaged by the short fall into the cup, while the albumen drains through into a receptacle below.

In the case of unseparated eggs or egg yolks, churning or sieving is employed before freezing to produce a homogeneous mass, but where whites are to be frozen separately care must be taken to avoid undue agitation, as this impairs the quality of the albumen. Freezing should be carried out fairly rapidly at about 14 to 15° F., at which temperature the egg meat can be stored indefinitely. The containers in which the eggs are frozen are usually either round or square tin cans of about 5 gallons capacity, capable of being made air-tight. No air space should be left in a filled can.

It is essential that during transport and storage frozen eggs should be maintained at a sufficiently low temperature. Once a can has been allowed to thaw, its contents should be used without delay. The preparation of dried eggs is not carried out on anything like so large a scale as that of frozen eggs, which are extensively employed in ice-cream making and both flour and sugar confectionery.

Dried Eggs.

Up to the breaking stage the preparation of eggs for drying is carried out in a manner identical with that for freezing. After breaking, the liquid yolks or whole eggs are taken to the drier, where 90 per cent. of the moisture is removed. About 3½ lbs. of whole egg meat (yolk and white), 2¼ lbs. of yolk, or 7¼ lbs. of white are required to produce 1 lb. of each in the dried state. Yolk is usually dried on the spray process by machinery adapted from milk-drying plant. Liquid yolk is pressure-sprayed into the upper part of a chamber heated to 160° F. and collected from the lower part of the chamber as a fine powder.

Occasionally a travelling aluminium belt, drum, or disc, passing through chambers heated to 140° F. is employed, the dried product being scraped off in the form of flakes as the belt leaves the hot chamber. The flakes are later ground to a fine powder, and are said to be more easily soluble than the spray-dried products.

The white or albumen has a higher water content and is usually dried at 120° F. on belts or shallow trays; it is usually left in flake form and rarely ground. The uses of dried egg products are similar to those of the frozen article, to which they are preferred by bakers or confectioners requiring comparatively small amounts of egg preparations or who have no refrigerating facilities for storing the frozen variety.

A Factory Operated by a Reader in Christchurch, New Zealand, for the Manufacture of Baking Powder.

Trade Notes

Welsh Canning Developments.

Welsh tinplate workers naturally have considerable interest in the progress of the British canning industry. At present, a correspondent informs us, 20 per cent. of Welsh tinplate works can attribute their employment solely to the demand created by the canneries, and it is said that, realising this, the men have become enthusiastic propagandists on behalf of the home-produced article, the local sales of which have increased considerably. In one large village store, supplying a community of 7,000 workers in the Swansea valley, the proprietor has abandoned the stocking of overseas brands entirely, and reports that the demand for British canned fruits and vegetables (particularly peas) is heavier than it has ever been.

Attention is also being given, adds our correspondent, to the possibility of creating canneries locally, and tests are at present in progress on a large tract of land in Gower, near Swansea, to determine its suitability for the cultivation of asparagus. One of the most interesting experiments at the present time concerns the possibility of canning cockles. The South Wales Sea Fisheries Committee decided last month to sow cockles at Goodwick, Newport, Milford Haven, Saundersfoot, Ferryside, in the Burry inlet at Penclawdd, Oxwich Bay, Cefn Patrick, and the Ogmore estuary. Experiments are being made at the Worcester canning laboratory with cockles taken from the famous Penclawdd beds. Mumbles oysters have also been sent to the Conway experimental laboratory for oyster breeding purposes.

* * *

Brussels Exhibition.

The International Institute of Bakers, in Brussels, will hold its tenth annual exhibition at 25, rue René Dubreucq, Bruxelles-Ixelles, from June 1 to July 31, 1932. There will be a number of international competitions for bread baking, butter making, honey, etc.

* * *

Imperial Fruit Show and Canners' Exhibition.

Some idea of the growth both in importance and in size of the Imperial Fruit Show, which is held annually each October, may be gauged from the fact that there are now only four cities in the British Isles with buildings vast enough to house this exhibition.

Birmingham is one of the four cities, and this year the Twelfth Annual Imperial Fruit Show, in conjunction with the Canners' and Allied Trades' Exhibition, will be staged in the Bingley Hall, which is being especially adapted for the occasion.

The show has the active support of the Ministry of Agriculture and Fisheries, all the Dominion and Colonial Governments, and the National Food Canning Council.

The 1932 exhibition promises to surpass all its predecessors, and will introduce many new features of importance to both the trade and the general public.

A large section will be devoted to exhibits by fruit growers and producers of canned fruit, dried fruit, and honey.

Readers contemplating exhibiting or participating in the classes for growers should make early application for details to the Imperial Fruit Show Offices, 5, Bloomsbury Square, London, W.C. 1.

* * *

15% Satisfactory.

The label shown herewith is one issued by the American Medical Association, which has recently appointed a "Food Committee" to examine and report on any food products which manufacturers care to submit. No fee is charged, whether the food examined

meets with approval or otherwise, and those whose products receive the official benediction are entitled to use the seal in their labels and publicity.

The chief interests of the committee centre on misdescription and adulteration. About 500 proprietary articles have been examined, but only 75, or 15 per cent., have been accepted, the remainder being rejected principally on the ground that the makers' publicity matter and the names given to the articles were not accurately representative of their actual composition. Several products, some nationally known in America, are said to have been renamed in order to qualify them for use of the seal.

* * *

According to the Association, the seal signifies: "(*a*) That the food article, its label, all related published or displayed advertising copy of any nature, statement of physical and chemical composition, process of manufacture, and other pertinent required information, have been submitted to the committee for its consideration.

"(*b*) That all 'health' or nutrition claims—either specific or by inference, appearing on package label, in any advertising copy, or published or displayed in any other form—harmonise and are in accord with the evidence submitted as to the chemical and biologic values of the finished product on the market.

"(*c*) That evidence has been submitted that the food product is neither adulterated nor misbranded under the terms and provisions of the Federal Food and Drugs Act or other Federal food statutes.

"(*d*) That claims, other than those of a 'health' or nutritional nature, offered in the manner mentioned under (*a*) are not self-evidently or grossly exaggerated, false, misleading, or deceptive."

* * *

Drydex Flavours.

Unusual ease of incorporation is one of the principal advantages claimed for "Drydex" flavours, which are produced by Messrs. A. Boake, Roberts and Co., Ltd. As their name implies, these flavours take the form of powder, which is stable and non-hygroscopic, and they work effectively when mixed, either by hand or by some simple mixer, with whatever article it is desired to flavour. Lemonade and jelly crystals, medicinal tablets and health salts are some products for which these flavours are now being used extensively with, it is said, considerable economies in time and cost. The flavour is stabilised, there being no danger of deterioration by oxidation or loss of flavour by evaporation, as is sometimes the case with liquid extracts.

* * *

Tornador.

Under the name of "Tornador," a new cleansing agent and water softener has been introduced by Messrs. A. Boake, Roberts and Co., Ltd.

The chief function of Tornador is to saponify fats, and to prevent the formation of the lime fats which leave a deposit of corrosive, sticky film on glass, porcelain, and other similar containers. It is a powerful alkali; more powerful, it is claimed, than most cleansing agents at present on the market, and consequently the use of Tornador renders it possible to effect a thorough cleansing with little trouble. In addition, it imparts the attractive polish to the cleansed container which is so necessary to glassware and porcelain.

Tornador, state the makers, is free from deleterious metals, it is non-injurious to the most tender skin, and can be used with perfect safety. For ordinary water softening purposes excellent results are obtained by using at the rate of 1 to 2 per cent. solution.

Trial samples with quotations are available to those readers who are interested and who care to make application to the manufacturers.

Italian Production Cherries in Brine.

Generally between 35 and 40 per cent. of the total Italian cherry crop is exported to foreign markets, the greater part of the fruit being shipped in brine, according to information contained in a report from Naples. The United States was formerly the most important outlet for cherries in brine, followed by Germany, Austria, France, and Great Britain. However, there was a marked decline in the shipments to the United States during 1931, as compared with previous years, and Canada, which had been an unimportant market heretofore, became a leading outlet for the production of 1931.

The total yield of the Italian cherry crop in 1931 for all of Italy was 82,334,800 pounds, as compared with 92,676,000 pounds in 1930.

Complete statistics of the total exports of cherries from Italy for the year 1931 are not yet available, but during the first ten months (January to October inclusive) it is noted that the quantity of cherries in brine shipped abroad was slightly in excess of the exports for the same period of 1930 but considerably below the shipments for that period in 1929. The value of the exports of brined cherries in 1931 was less than in 1930 and markedly below that for the ten months' period in 1929.

The following table shows the exports of cherries in brine from Italy during the first ten months of 1929, 1930, and 1931 :

Exports of Cherries in Brine.

Ten Months.		Pounds.	£
1929	...	21,606,914	570,000
1930	...	5,927,658	186,000
1931	...	6,991,529	169,000

* * *

Meat Inspection.

In the United States, meat packing houses doing an interstate or export business are subject to Government inspection, and only meat products stamped with the official approval seal can be marketed. On the other hand, smaller organisations which do no export business and do not trade beyond the boundaries of their own State are subject to no such compulsion and can sell their products without Federal approval. In St. Louis, for example, there are no less than 25 to 30 non-inspected plants, the competition from which has proved irksome to the larger concerns.

Accordingly, eight of the registered packing houses combined not long ago in an advertising scheme boosting the advantages of inspected meat and inferring, of course, that the purchase of any meat or meat products not so stamped is attended with all sorts of dire and distressing risks.

Some of the chain stores, doing a considerable business in meats, associated themselves with the campaign ; one, for instance, announced that " every pound of meat sold has been purchased from a packing plant operating under U.S. Government inspection."

* * *

E.M.B.'s Exhibition Programme.

The Empire Marketing Board has decided to take part in the following exhibitions during its new financial year, which started on April 1 :

The Nation's Foods Exhibition, Olympia, May 21 to June 4.

The Confectioners', Bakers', and Allied Traders' Exhibition, Royal Agricultural Hall, September 3 to 9.

The Grocery, Provision, Oil and Italian Warehouse, and Allied Trades' Exhibition, Royal Agricultural Hall, September 17 to 23.

The Imperial Fruit Show, Birmingham, October 21 to 29.

British Industries Fair, 1933, Olympia, February 20 to March 3.

* * *

Beans for Canning.

Messrs. C. Hogg Martin and Co. inform us that samples of Canadian beans are now available. Also that on account of the low price of Japanese beans at the present time certain manufacturers are taking in supplies of both Ohtenashi and the neglected Kotenashi. They state that their " Flora " peas continue to give satisfaction to many of the principal packers and canners. It is understood that these peas, together with Canadian, Danubian, and Ohtenashi beans, are to be put through comprehensive tests at the canning research station, where, also, the culture tests made at Kirton Station and at Reading last year will be supplemented by further culture tests.

* * *

Can Making.

We have received from Messrs. E. W. Bliss Co., of London, a very useful and attractive booklet describing the modern methods and machinery used in can making. It opens with a résumé of the history of canister development. The construction of cans is then described in detail, many useful practical points being given. This is a booklet which will be found of considerable interest and assistance to all concerned with canning.

* * *

We have received from the Drayton Regulator and Instrument Co., Ltd., a leaflet containing particulars of their Model VN. Steam De-superheater with automatic nozzle control.

* * *

The Automotive Products Co., of London, have issued a leaflet describing their new Metal Element Filter, suitable for the filtration of a variety of liquids in all trades. Interesting points are the unique method of constructing the filtering element and the ease with which it can be cleaned out without dismantling.

The C. O. Ericsson Engineering Works, Ltd., of Birmingham, have sent us particulars of their " Express " filling machine for the rapid filling of eclairs, cream buns, etc., with cream, jam, and other materials. It is also used for jellying pies, etc. This firm is well known for its pie case moulding machines, mixing, and other modern pie factory and bakery plant.

* * *

Newcastle Chemical Industry Club.

Two years ago the Newcastle Chemical Industry Club showed considerable enterprise by reducing its subscription and so drawing members from a larger field. The soundness of this policy has now been fully proved. At the recent annual general meeting it was stated that a steady increase in the number of members had enabled a satisfactory financial position to be maintained, but still more valuable was the progress in drawing together the technical staffs of local industries.

The affiliation of the club library with the Northern Regional Library Scheme has made highly specialised books available to a much wider circle than the actual membership of the club. The importance of this facility has been recognised by some of the leading Tyneside firms, whose support has helped to secure a number of recent publications on industrial chemistry. Further, the gift of new volumes and journals from technical societies and individuals is successfully expanding the practical utility of the library.

The club's general activities have been well maintained with new developments in several directions, including the holding of a German class and the publication of a calendar of all local technical meetings for the season.

* * *

Major D. J. Colville, M.P., Parliamentary Secretary to the Board of Trade, will give an address on " The Food Resources of the British Empire," under the auspices of the Nation's Foods Exhibition, at the Royal Empire Society, Northumberland Avenue, W.C., on Thursday, May 5, at 4 o'clock. Colonel Sir A. Weston Jarvis, Chairman of the Royal Empire Society, will preside.

* * *

The President of the Federation of British Industries, Sir George Beharrell, D.S.O., has consented to become Honorary Patron of the Nation's Foods Exhibition.

* * *

We found much interesting and useful information in a most attractive booklet issued by A. Boake, Roberts and Co., Ltd., London. This gives the most detailed account we have so far come across of the citrus products industry of Sicily. The information about lemon oil, bergamot oil, etc., is of a practical nature and will have a wide appeal. Our congratulations to Messrs. A. Boake, Roberts and Co. for this artistic and informative production.

Enquiries

Enquiries are dealt with immediately on receipt, and the desired information is communicated in full by private letter. The replies given below are merely brief abstracts or indications that the names and addresses, or whatever may have been requested, have been supplied. Any further information supplied to us relating to the questions appearing below will be passed on to the enquirers. **N.B.—Enquirers are requested to use the special form in the advertisement section.**

Mint Creams.

591. *We shall be glad if you will furnish us with the formula and method for making peppermint creams similar to the sample supplied. The creams are not crystallised and yet keep their softness.* (Yorkshire.)

The secret, if one can call it, of making good mint creams lies in preparing a satisfactory glazing solution. Such a solution may be prepared, for example, by dissolving equal parts of gum arabic and egg albumen in water.

The sample submitted is of superior quality, due to care, experience, and excellent craftsmanship. Without these, the quoting of a formula is not of much use. A formula which is probably similar to the one used for preparing the sample is as follows:

A syrup is prepared by adding 3½ ozs. of water to 1 lb. of a good invert sugar, such as Nulomoline. Heat the latter just enough to clear and then add the water.

A fondant is made by cooking together 80 lbs. of very white sugar, 10 lbs. of glucose, and 10 lbs. of Nulomoline. This syrup is prepared with 41 lbs. of water and is cooked to 244° F. When thoroughly cooled it is beaten to fondant in any way chosen.

Within an hour of the time of making, the fondant is melted down in a water-jacketed pan and the body reduced to casting consistency by addition of the first syrup mentioned. The creams are cast as cool as possible in rubber mats.

592. *What products can be made from banana flour and where can I get recipes and supplies? Where can I get supplies of soya flour?* (Glasgow.)

Soya flour can be obtained from the Soya Flour Manufacturing Co., Ltd., London. As regards banana flour, see the next issue of FOOD MANUFACTURE.

593. *Kindly supply suitable names of firms manufacturing biscuit making machinery.* (London.)

These were forwarded.

594. *We should be obliged if you would put us in touch with a firm who make machines for filling fairly thick liquids into bottles.* (Midlands.)

This was done.

595. *Re Enquiry 565, we also should be pleased to be placed in touch with the manufacturers of powdered lemon peel.* (Reading.)

This was done.

596. *We wish to know where we can obtain inexpensive equipment for washing glass jars; also the names of firms able to supply us with wire trays and small sterilising plant for dealing with clotted cream.* (Cornwall.)

These particulars were furnished.

597. *We shall be obliged if you can put us in touch with the suppliers of glass dishes, ½-lb. or ¾-lb. sizes, and caps to fit.* (Stirling.)

This was done.

Banana Drying.

598. *Can you tell us where to obtain technical information on the preparation of banana "figs"—i.e., the banana peeled and dried whole?* (London.)

Professor Cruess, of Berkeley, California, is the authority on fruit drying. He states that green fruit is peeled after loosening the skin by blanching. The peeled fruit is sulphured a short time, dried on trays until brittle, ground and bolted to make *banana flour*.

Ripe bananas are peeled and dried whole; these are known as *banana figs* and are dark in colour, but if the ripe fruit is sliced lengthwise and sulphured for 20 minutes before drying, a much more attractive product is obtained.

Large quantities of bananas go to waste in the tropics because of slight blemishes, over-ripeness, etc.; dehydration is a means of conserving much of this fruit and rendering it available as food.

Further particulars will be given in the next issue of FOOD MANUFACTURE.

Marzipan.

599. *I am wondering if you could help me to get into touch with some literature on the manufacture of marzipan and almond goods, including the grinding, blanching, milling, etc., of almonds.* (London.)

In Skuse's *Complete Confectioner* there are several recipes for marzipan goods. There was also an article on the manufacture of marzipan in the January issue of FOOD MANUFACTURE. Dr. Jordan, in his *Confectionery Problems* (1930), remarks that almond paste, which is composed of blanched almonds, sugar, and water, will last only a few months unless the temperature is kept below 45°. Enzyme action, perhaps due to invertase, causes the sugar to split up into invert sugar. It is not possible to heat almond paste sufficiently high to arrest enzyme action for, in so doing, the vegetable albumen present will be coagulated and the consistency of the product will not be satisfactory. Thus it is necessary to remove sufficient water to prevent mould growth. The product should be packed in air-tight containers. All air cannot be removed from almond paste, even under vacuum, and sufficient moisture is present to allow slow enzyme action. The amount of invert sugar gives a rough guide to the quality of the product.

600. *I understand that sodium benzoate is used in the preparation of certain foodstuffs, and I should very much appreciate it if you could give me some further information on this point.* (Belgium.)

Those parts of the Public Health (Preservatives, etc., in Food) Regulations, 1925, relating to the permitted amounts of benzoic acid in certain foodstuffs were quoted.

Potted Meat and Paste.

601. *I should be obliged if you could advise me as to the definitions, legal or otherwise, of potted meat and fish, and of potted meat and fish paste. In the former case of potted meat and fish, the contents of the jar should, I imagine, be practically 100 per cent. of meat or fish, while in the latter case, potted meat and fish paste, the filling might possibly amount to 50 per cent. or even more of the contents.* (Somerset.)

The trade custom is that potted meat and fish must be absolutely 100 per cent.; no filler is allowed.

In the case of a pot of meat and fish paste, the amount of filler permitted is less than you assume. It is not more than 10 to 12 per cent., and, further, the water content must not be above about 64 per cent.

Actually, comparatively few foodstuffs have a legal definition; most of them are governed by the fact that in the legal

view the food must be substantially what it is represented to be—*i.e.*, if you label a product salmon and shrimp paste, it must consist of a reasonable proportion of the articles named.

If it is called a fish paste, for example, there must be more fish in it than a starchy filler. Otherwise, when trouble occurs, the usual charge made by the authorities is of selling a product "not of the nature and substance demanded."

Ice cream Powders.

602. *Can you inform me if ice-cream mix powders may be successfully made using arrowroot as a base instead of cornflour? I am anxious to obtain a recipe for such a powder mix with stabiliser, colouring, and flavouring included.*

You recently supplied me with the names of certain firms who specialise in the making of paper containers. I have since been in communication with them and would here take the opportunity of thanking you for the introductions. (Bristol.)

Arrowroot is frequently used as a base for ice-cream powders. It suffers from the disadvantage of all farinaceous binders in that it is not very effective in preventing ice crystal growth if the frozen ice-cream is stored for any length of time.

Tragacanth and gelatine are sometimes added to overcome this defect, though the rather severe heating necessary to rupture the starch granules and so allow the arrowroot (or other starch base) to act, somewhat adversely affects the stabilising action of such additions. Skim milk powder is also sometimes added to increase the mix solids content, and sugar as a diluent almost invariably so.

It is necessary to have about 4 per cent. arrowroot in the mix to secure satisfactory results, and the following tentative formula has been constructed as a basis for further experiments:

Arrowroot	4 ozs.
Powdered gelatine	½ oz.
Skim milk powder	1½ ozs.
Sugar (powder)	6 ozs.

Add this to full-cream milk in the proportion of 6 ozs. powder to each quart of milk, plus an additional 6 to 8 ozs. sugar.

Heat the milk in a water-jacketed pan to about 90° C. Make the requisite quantity of powder into a thin cream with a little cold milk, and pour slowly into almost boiling bulk milk with vigorous agitation. Continue heating the whole on water-bath for another 10 to 15 minutes until it has finished thickening. Cool and freeze.

Of course, the colour and flavour (vanillin, possibly) added must depend on the quality of these materials.

One would again mention the possibility of a minimum butter fat standard for ice-cream being enforced in future.

603. *Do you know of any firm making a machine to peel boiled beetroots?* (Scotland.)

Suggestions were made.

604. *Will you kindly supply the name of an English firm making a machine for the peeling of pickling onions?* (Middlesbrough, Birmingham, Durham, and Selby.)

Names supplied.

605. *Can you inform us of the name of the manufacturers of an automatic machine for sticking celluloid discs on to colour pattern cards?* (London.)

Names supplied.

606. *We are considering the question of replacing our trade in French canned vegetables with English-packed canned goods, both vegetables and fruits. We shall be glad to know whether you can put us in touch with English canners who could supply us with such goods under a plain label or neutral brand.* (London.)

Suggestions were made.

607. *On page 48 of your February issue you refer to sodium glutamate. I would like to procure a sample and obtain information in regard to cost and strength of this substance; also where to procure it.* (Newfoundland.)

Name and address supplied.

Honey Mixture.

608. *I have been trying out a recipe for honey mixture consisting of sugar, honey, water, colour, and flavour, but after several days it becomes somewhat sugary. Can you suggest the cause of the trouble?* (Northampton.)

We have had no experience with this but it should not be difficult to overcome the difficulty. You might try adding a little lemon juice and heating to invert part of the sugar, if this is the one that is crystallising out, or you might replace all or part of the sugar with glucose; also a little gum tragacanth or gelatine or albumen might be added. In the preparation of "honey nougat," 10 lbs. honey and 5 lbs. glucose are heated together until the mixture is clear. In the case of nougat, this mixture is afterwards beaten with 2 lbs. albumen dissolved in 2 quarts of water. These remarks might give you ideas for making your own experiments.

609. *Formulæ required for sauces suitable for use in packing pork and beans.* (Newfoundland.)

Examples were furnished.

610. *Kindly supply recipes for ice-cream powder.* (Sweden.)

This was dealt with in the Enquiry section of the November, 1931, issue.

611. (1) *We would like to know the names of makers of butter moulding and weighing machines.*

(2) *Where can we procure a copy of "Cake Making and Small Goods Production," by Bennion and Stewart?*

(3) *We should like to know how "Yeastless" sausage rusks are manufactured.* (Ireland.)

This information was supplied. See Enquiry No. 613.

612. *Recipe for piccalilli required.* (London.)

An example of such was supplied.

613. *We should be obliged if you could inform us if there is a substitute for yeast used in baking purposes.* (Leeds.)

Surely, any one of the various mixtures used as a "baking powder" is a substitute for yeast? Bennion and Stewart give a detailed account of this subject in their book on Cake Making.

614. *Would you kindly supply us with names of manufacturers making a small machine for shaping and weighing butter by the wire-cutting process?* (Birmingham.)

Names supplied.

Sterilising Milk Cans.

615. *Milk cans and other utensils after being sterilised by means of steam at 50 to 60 lbs. have to be drained to prevent rusting, since the heat imparted by steaming is not sufficient to dry the condensed water. Can you help us in any way with this matter?* (Stranraer.)

It is certainly very important to send out the cans in a dry condition, as apart from rust the presence of moisture would render the cans susceptible to infection.

Undoubtedly the safest way would be to use hot air sterilisation in place of steam, but the trouble here is the low rate of heat transfer, and this would mean keeping the cans in the chamber for a longer period than in a steam chamber.

One way worth trying is to heat the cans before putting them into the steam sterilising chamber, so as to avoid the initial condensation.

616. *We shall be pleased to receive a suitable formula for the manufacture of fruit jellies with gelatine.* (London.)

This was fully dealt with in the June, 1930, issue of FOOD MANUFACTURE. See also *Food Industries Manual.*

617. *Do you know of makers of machines for forming "curly rolls" or "scrolls" from butter?* (Weston.)

Suggestions made.

618. *Required the addresses of firms supplying sodium and calcium glutamates.* (Hull.)

Suggestions made.

Kosher Jelly.

619. *We understand that a Kosher jelly from agar is being made in England, and we are wondering if you could put us in touch with the parties who are making this.* (California.)

We should be glad to receive information on this point from any reader.

620. *I am in urgent need of some "Spramalt" powder for my experiments. Will you request the makers to forward a small quantity?* (Bombay.)

We have made enquiries in connection with "Spramalt" and have been informed that this is a spray dried malt powder of American origin, but we have been unable to find any firm in this country who could supply it.

Cheese Canning.

621. *We desire to pack preserved Gruyère cheese in vacuum tins and then to sterilise them. How long and at what temperature must sterilisation be effected without spoiling the quality of the cheese? What kind of vacuum machine do you recommend, and is there any firm in your country manufacturing special paper to use for packing processed cheese?* (Switzerland.)

The name of a firm was given who are able to supply a suitable vacuum machine and recommendations were made for suppliers of wrapping material.

The temperature of sterilisation may vary from 180° F. to 240° F., depending on the climate of the country it is intended to supply. The duration of sterilisation will depend on the size of the tins, and can be readily determined by trial.

Preservation of Specimens.

622. *We are enclosing an enquiry form for a question which we should like to have you send us the answer and print in your magazine if you see fit. Our problem is the preservation of fruit varieties for display purposes. This does not necessitate that the product be edible thereafter, but our problem is such that if preserved in alcohol, as some of the common formulæ advise, the colour and bloom as well as sometimes the texture of the product are somewhat destroyed.*

Our purpose at this experiment station is to display various varieties of fruit in as nearly the original condition as possible in our containers. We have not found a formula which preserved this colour, especially in the fruit and berries. For vegetables, where green is the dominant colour, it is not so difficult. If you can help us, we shall be very much obliged. (U.S.A.)

Possibly the following may serve as a basis for further experiments. It will be noticed that this formula really refers to meat.

KAISERLING'S METHOD OF PRESERVING PATHOLOGICAL SPECIMENS.

Specimens should be fresh. They should be placed in No. 1 solution as soon as possible after they have been cut. Blood on outer surface should not be allowed to oxidise.

No. 1 Solution.

Formalin	800 c.c.
Water	4,000 c.c.
Pot. acetate	85 grams.
Pot. nitrate	45 grams.
Glycerine	150 c.c.

(Specimens cannot be kept too long in this fluid. For small pieces, three days at least should be given. For kidney, one week is necessary. For liver, two weeks.)

No. 2 Solution.

Methylated spirits (80 per cent. alcohol).

Specimen placed in this solution till colour returns (about one hour). Several changes of methylated spirits should be used. Process should be watched carefully.

No. 3 Solution.

Water	10,000 c.c.
Glycerine	400 c.c.
Salt (NaCl)	15 ozs. (425 grs.)

Specimen left in this solution permanently.

We know of an authority here who made successful experiments in connection with a competition held in America some years ago, a prize being offered to the person who discovered a formula and method for preserving exhibition fruits and vegetables. The enquirer was put in touch with this authority.

623. *If we understand it rightly, large pieces of boiled sweets cannot be made by the drop-roller method, but are made by pouring into moulds. We should like to know the names of makers of such moulds.* (Bombay.)

Information supplied.

624. *We have received an enquiry for a shaking machine for dealing with one and two gross ordinary 1-lb. bags of flour, which have to be shaken down previous to being sealed. The approximate size of the bags is 3 × 3 × 5 ins. We shall be glad if you can submit names of firms who manufacture such machines.* (Gloucester.)

Recommendations were made.

Alcohol.

625. *Kindly give us the name of a trustworthy house that supplies 70 to 80 per cent. alcohol. How is the strength of alcohol determined?* (Tournafulla.)

Names of suitable firms were given.

For the determination of the strength of the alcohol, the simplest way is to purchase Sykes' hydrometer and tables. These will enable you to determine the degree of over and under proof.

Another method is to make a specific gravity determination by means of a specific gravity bottle, as described in a book such as *Alcohol: Its Production, Properties, Chemistry, and Industrial Applications*, by Charles Simmonds, which also gives tables showing the relationship between specific gravity and percentage composition.

626. *Kindly send instructions for the preparation of mustard prepared in cream form.* (New Zealand.)

An article on this subject is shortly to appear in FOOD MANUFACTURE.

627. *We notice in your January issue under Enquiry 454 that you supplied the name of a firm selling equipment for cleansing casks using steam.*

We should be obliged if you would ask the firm referred to if they have any equipment suitable for cleansing vinegar casks of sizes varying from 5 gallons to 56 gallons. We do not require any very elaborate equipment. (New Zealand.)

The names of suitable firms were given.

628. *We are wondering whether you can inform us of the name of a firm that supplies power semi-automatic or automatic closing machines for Phœnix caps.* (Midlands.)

Names supplied.

629. *We are taking the liberty of writing to you for some information which will be of the greatest assistance to us.*

We are very anxious to get in touch with the makers of the following, and thought you would be in the best position to supply us with names and addresses:

1. *Machines for putting lids on tins and cans.*
2. *Sterilising chambers.*

3. *Electric soldering machines.*
4. *Machines for making canisters.*
Any information and particulars which you can furnish will be greatly appreciated. (Lancashire.)

This information was furnished.

630. *We wish to know the name of the English agent for the "Lightnin" portable mixers.* (London.)

This was given.

631. *We are desirous of installing modern methods for the preserving of meats in glass and tins, and should be grateful for any information (particularly on cooling) you can give us on the subject.* (Glasgow.)

In the December, 1931, issue we published quite a considerable amount of information on this subject of cooling cans. The third part of Mr. Samson's article (page 351) dealt with the packing of meats in tin and glass containers, and in the January, 1932, issue the fourth part of his article discussed the cooling of glasses.

632. *In your March issue under Enquiry No. 535 we note that you have been asked by someone if you could put them in touch with makers of machines suitable for packing yeast in packets wrapped in aluminium foil. We shall be very glad to have the same information.* (Edinburgh.)

This was supplied.

633. *We are considering the possibility of packing ground almonds, and would be obliged if you could give us the names of manufacturers of blanching, drying, and grinding plants.* (Gloucestershire.)

Names were furnished.

634. *What process is used for pulping soft fruit, say, raspberries, for the jam factory?*
Are wooden casks extensively used for this process, and are they treated in any way?
Are metal containers used for the pulp?
What firms sell beverages made from fruit juices? (Bristol.)

Answers to these questions are to be found in the present issue.

Canned Soya Beans.

635. *I am anxious to know if soya beans may be packed in tins, alone or with other legumes. Also, can soya beans be used directly as an edible vegetable?* (Liverpool.)

This bean was packed by some during the late war, but the results were never satisfactory, as they had a peculiar oily taste and were invariably quite hard, because the pickers did not know how to handle them properly. In packing soya beans, they should be soaked 12 to 14 hours and then cooked (boiled) until soft (which may require several hours) before filling into cans. Cover with plain sauce and process the same as other beans. Some packed the beans in a tomato sauce and labelled them pork and beans, which was misleading.

There is only a little demand for the product, and they are not packed extensively to-day. Exhaust and process the same time and temperature used for pork and beans.

We do not consider ordinary raw soya beans a suitable legume for inclusion in mixed vegetable tinned goods. The soya bean in its natural state contains certain toxic elements which, while admittedly not present in very large proportions, do undoubtedly have a disturbing effect upon the stomach. These undesirable constituents may be removed by the Berczeller process.

636. *Would you kindly send me the names of firms supplying machinery for the making of paper containers similar in size and shape to 16-oz. evaporated milk tins?* (Bristol.)

Names were suggested.

637. *There are certain firms who are marketing cream in hermetically sealed tins similar to condensed milk tins. Perhaps you could inform me, if this is synthetic cream, how it is treated.* (Devonshire.)

Although synthetic cream, or, more accurately, reconstituted cream, is an article which is commonly used in the baking trades, we have never heard of this article being put up in cans.

On the other hand, true cream is being put up in cans, and the practice is growing. An account of the methods and plant employed was published in the April issue of FOOD MANUFACTURE.

638. *Information required as to the food regulations in force in various foreign countries.* (Midlands.)

This would require a whole library to give full particulars (see our remarks in the present issue). One plan is to communicate with the various Government offices (see *Food Industries Manual*). An excellent summary is to be found in the *Handbook of Foreign Tariffs and Import Regulations of Agricultural Products. II. Canned Foods in Europe*, issued by the U.S. Department of Commerce, Washington.

639. *We would be obliged if you could give us the names of firms making the plant necessary for the manufacture of shredded suet.* (Middlesex.)

Names were suggested.

640. *We are looking for a good mix of ice-cream powder which can be made with cold milk.* (London.)

See page 338, November, 1931, issue of this journal.

641. *With a view to installing plant for the more economic and extensive manufacture of my product, I am considering the purchase of a more up-to-date pan for boiling.*
Will you be good enough to supply me with a list of manufacturers of such appliances?
The available appliances for supplying heat are gas and electricity (no steam power), and my requirements for a pan to hold 4 cwts., to be steam-jacketed, and made of a metal suitable for the manufacture of lemon curd. (Derbyshire.)

Suitable names were supplied.

642. *Please supply times and temperatures of sterilisation for the canning and bottling of fruits and vegetables of various kinds; also the strengths of the syrups and brines used.* (Midlands.)

The enquirer was referred to the particulars given in the Canning Section of the *Food Industries Manual.*

643. *We are interested in a very small homogeniser for laboratory purposes, intended for handling from 1 to 2 pints only of a creamy substance. We shall appreciate your putting us in touch with a firm handling such machines.* (Middlesex.)

This was done.

644. *Could you inform us as to who supply machinery for the preparation of vermicelli?* (London.)

Apparently the manufacture of this class of machinery is confined to Italy. The matter largely resolves itself into rolling machines for making the paste from which the macaroni is ultimately formed. Further particulars are given on another page of the present issue.

645. *Would you please endeavour to get me a book dealing with the essence industries?* (South Africa.)

We are not quite clear if you require a book giving particulars of the manufacturing processes for synthetic essences or the production of essential oils by the ordinary distillation processes. If you require the former we are afraid you will find it difficult to obtain.

There are one or two German and French works in which you would find some information, but, of course, you will appreciate that the processes for the production of synthetic essences are carefully guarded by the manufacturers and they are not likely to be published.

If, on the other hand, you require a book dealing with the subject in general—for instance, giving particulars of the use of essences for flavouring and perfuming purposes—there are several of these, and one in particular dealing with the flavouring of foodstuffs is shortly to be published. This is written by Mr. Redgrove, and we could give you further particulars later if you were interested.

646. *Information required on the canning of tomatoes.* (Lancs.)

Some particulars are to be given in the next issue. We cannot be expected to answer such a general question satisfactorily. Kindly give us more specific requirements.

647. *Please recommend a reliable person for advising us on the preparation of an invalid food to contain malt extract, meat extract, and eggs.* (India.)

This was done.

648. *I should be much obliged if you would give me the names of three or four reliable British packers of tomato paste in tins.* (British Guiana.)

Suggestions made.

649. *We shall be much obliged if you will give us particulars of the method used in China for the breaking and freezing of eggs.* (Ireland.)

See article in the present issue.

New Companies

GREGSON BROTHERS (PRESTON), LIMITED. (264046.) Winckley Street, Preston. To carry on the bus. of cheese, dairy produce and provision mchts., etc. Nom. Cap. : £1,600 in £1 shares.

MIDLAND CAKERIES, LIMITED. (264127.) To carry on the bus. of confectioners, bakers, etc. Nom. Cap. : £200 in £1 shares. Dirs. : To be appointed by the subs. Qual. of dirs. : Fifty shares. Remun. of dirs. : £52 per annum.

FRANCIS NICHOLLS (LEICESTER), LIMITED. 21, Moat Lane, Birmingham. To carry on the bus. of fruit, vegetable and produce importers, and brokers, etc. Nom. Cap. : £5,000 in £1 shares.

RIDLEY AND HOULDING, LIMITED. (264105.) 10, Russell Street, Covent Garden, W.C. 2. To carry on the bus. of fruit and genl. produce mchts., etc. Nom. Cap. : £30,000 in 11,700 pref. and 18,000 ord. of £1 and 6,000 employés' shares of 1s.

JONES BROTHERS (CARDIFF), LIMITED. (264178.) Bakers Row, Wharton Street, Cardiff. To carry on the bus. of mnfrs. of and dlrs. in confectionery, etc. Nom. Cap. : £1,500 in £1 shares.

CARTER AND COMPANY (HORNCHURCH), LIMITED. (264146.) 161, High Street, Hornchurch. To carry on the bus. of corn, seed and flour mchts., etc. Nom. Cap. : £2,000 in £1 shares.

GRAYDON AND CHILD, LIMITED. (264236.) To take over the bus. of confectioners cd. on at Halifax as Graydon and Child. Nom. Cap. : £3,000 in £1 shares.

ANGLO CYDER MILLS, LIMITED. (264194.) Anglo Cyder Mills, Shepton Mallet, Somerset. To carry on the bus. of cider makers, mchts. and agents, etc. Nom. Cap. : £100 in £1 shares.

GEORGE A. PALMER, LIMITED. (264122.) To carry on the bus. of dlrs. in and makers of fish meal and poultry foods, etc. Nom. Cap. : £5,000 in £1 shares (2,000 pref. and 3,000 ord.).

WILLIAM CATER, LIMITED. (264262.) To carry on the bus. of mnfrs. of and dlrs. in food products, in particular soup and chicken-broth cubes, meat extracts, etc. Nom. Cap. : £2,000 in £1 shares.

MADGE BREWSTER, LIMITED. (264245.) 14, Chapel Street, Southport. To take over the bus. of a confectioner cd. on at Southport as Madge Brewster. Nom. Cap. : £7,500 in £1 shares.

EDDISONS (DRIGHLINGTON), LIMITED. (263197.) To carry on the bus. of confectioners, etc. Nom. Cap. : £500 in £1 shares.

ROJAM, LIMITED. (263221.) To carry on the bus. of importers and exporters of and dlrs. in dairy, farm and garden produce, etc. Nom. Cap. : £100 in 1s. shares.

H. GIBSON AND SON, LIMITED. (263202.) To carry on the bus. of mnfrs. of and dlrs. in confectionery, etc. Nom. Cap. : £1,000 in £1 shares.

JACQUES MORRIS AND CO. (LONDON), LIMITED. (263315.) 28-29, Southampton Street, Covent Garden, W.C. 2. To carry on the bus. of importers and exporters of and buyers and sellers on commission of potatoes, fruit, flowers, etc. Nom. Cap. : £1,000 in £1 shares.

STEWART'S (LIMEHOUSE), LIMITED. (263267.) To take over the bus. of confectioners, etc., cd. on at 215 and 217, Salmon Lane, Limehouse, E., as Stewart's. Nom. Cap. : £3,000 in £1 shares.

W. A. LEMMER AND SONS, LIMITED. (263327.) To take over the bus. of wholesale yeast mchts. and bakers' sundriesmen cd. on at 217, Mackintosh Place, Cardiff, as W. A. Lemmer and Sons. Nom. Cap. : £1,000 in £1 shares.

TEA AND PROVISION DISTRIBUTORS, LIMITED. (263363.) To carry on the bus. of mnfrs. of and dlrs. in tea, coffee, and cocoa; grocers, etc. Nom. Cap. : £100 in £1 shares.

PAGE AND SHAW, LIMITED. (263355.) Chocolate of Excellence Factory, Bath Road, Hounslow, Middlesex. To take over the bus. of candy mnfrs. and dlrs. cd. on as Page and Shaw. Nom. Cap. : £5,000 in £1 shares.

BRITISH DAIRY PRODUCTS, LIMITED. (263375.) To deal in bacon, butter, cheese, milk, etc. Nom. Cap. : £500 in £1 shares.

PURE CONFECTIONERY COMPANY (GATESHEAD), LIMITED. (263399.) To carry on the bus. of confectioners, etc. Nom. Cap. : £200 in £1 shares.

NOBBY'S PRODUCTS, LIMITED. (263395.) 1, Minster Gates, York. To carry on the bus. of grocers, provision mchts., mnfrs. of and dlrs. in patent foods and drinks, etc. Nom. Cap. : £100 in £1 shares.

MANUFACTURING CONFECTIONERS' PROTECTION SOCIETY, LIMITED. (263697.) To promote the welfare and interests of members, etc. Nom. Cap. : £300 in 40 ord. shares of £5 and 2,000 members' shares of 1s.

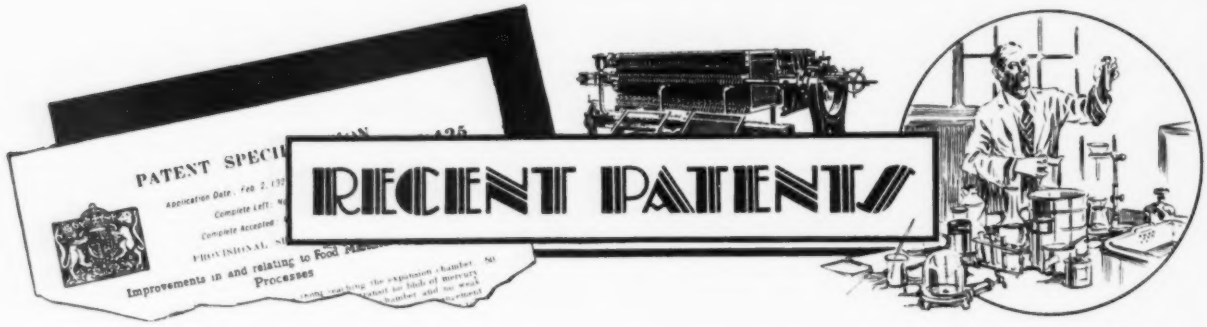
C. THOMAS (BAKERS), LIMITED. (263684.) To take over the bus. of a baker and confectioner cd. on by Christina Thomas at 705, Abbeydale Road, Sheffield. Nom. Cap. : £2,000 in £1 shares.

FRANK SNAILHAM, LIMITED. (263343). Peel Street, Bishop Auckland. To take over the bus. of wholesale fruit and produce mchts., garage proprs., etc., cd. on by F. E. Snailham, H. P. Peart, and C. Young at Bishop Auckland or elsewhere. Nom. Cap. : £1,000 in £1 shares.

JELLINGS, PUGH, AND COMPANY, LIMITED. (263348.) To take over the bus. of a dried fruit, nut, and vegetable dlr. cd. on by L. F. Pugh at 13 to 17, Duncan Street, Bradford. Nom. Cap. : £1,000 in £1 shares (600 pref. and 400 ord.).

ASSOCIATED BRITISH PRODUCE IMPORTERS, LIMITED. (263709.) To import eggs, meat and genl. farm produce, food and provisions, etc. Nom. Cap. : £10,000 in 9,500 pref. shares of £1, 9,500 ord. shares of 1s., and 6,000 management shares of 1d.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.



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Latest Patent Applications

8933. WILLE, O.: Method of preserving fish. March 29.

7940. BERKEL, C. F. M. VAN, and FITZPATRICK, H. D.: Slicing machines. March 17.

7693. BURR, W. F., GRIGGS, V. H., and NEALE, H. A.: Preservation of foodstuffs. March 15.

8226. TOMKINS, R. G., and MORAN, T.: Preservation and storage of meat, etc. March 19.

7053. ALDISTON, S.: Cooking apparatus. March 9.

Specifications Published

368,839. BERKEL AND PARNALL'S SLICING MACHINE MANUFACTURING CO., LTD., and THOMAS, H.: Slicing machines.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2., at the uniform price of 1s. each.

Abstracts Published

Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

362,911. **Purifying sugar.** GROVES, W. W., 30, Southampton Buildings, London. (TEATINI, D., Hougaerde, Belgium.)

Sugar crystals separated from massecuites are freed from the film of material remaining thereon after centrifuging by treating the crystals in the centrifuge with a small proportion of sulphur dioxide, dissolved in water or diluted with a gas or vapour such as steam. The concentration of the sulphur dioxide is so selected that the run-off, or the mixture of the mother liquor and the run-off, has a *p*H value not lower than that in its subsequent working up. If the treatment with sulphur dioxide would lower the *p*H value of the expelled liquids below the desired limit, the crystals are first treated with an alkaline substance such as a solution of lime or sodium carbonate. The treatment with sulphur dioxide may be followed by washing with a suitable liquid, or with suitable gas or vapour, preferably supplied under pressure. A sulphite, bisulphite, carbonate, or carbon dioxide may be used instead of sulphur dioxide.

360,117. **Cutting and moulding butter.** HENRY, W., 24, Sagimor Gardens, Bloomfield, Belfast.

In an apparatus for moulding balls or rolls of butter for service at table, the butter is extruded by an intermittently moving ram through apertures in the base of a container, and divided by an oscillating cutter into portions, which fall into the channelled periphery of a drum and are carried round through an arcuate channel which co-operates with the periphery to give the portions the desired shape and pattern before they are discharged into a receptacle. The cutter moves in the intervals when the ram is at rest. Cooled water to prevent sticking may be supplied from the vessel to the upper end of the channel. The container may be surrounded by a tank containing water, brine, or ice for cooling. The moving parts are operated from a shaft driven from a motor. The ram is pushed in by a feed-bar splined to move longitudinally through a housing and threaded in a bevel wheel which gears with a wheel on a spindle driven by a spur, pawl, and ratchet, and lever mechanism by a cam on the shaft. The extrusion of butter is automatically stopped as the ram approaches the bottom of the container, the bevel wheel being moved out of gear when an abutment on the bar engages a tip. The feed-bar can then be moved by a hand wheel and a bevel wheel. The shaft of the drum is hollow and is driven by a worm gearing, a vertical shaft, and bevel gearing from the shaft. The cutter is carried by an arm fixed to a shaft which is oscillated within a hollow shaft by means of worm gearing and a vertical rod, the upper end of which is pushed downward against the pressure of a spring by a cam.

Tomato Products

We regret that owing to lack of space it has not been found possible to include in this month's issue an article on Tomato Juice and Tomato Canning, and the same applies to Dr. Clayton's article on the Brine Fermentation of Vegetables, as well as an article by Professor Cruess on Food Preservation.

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